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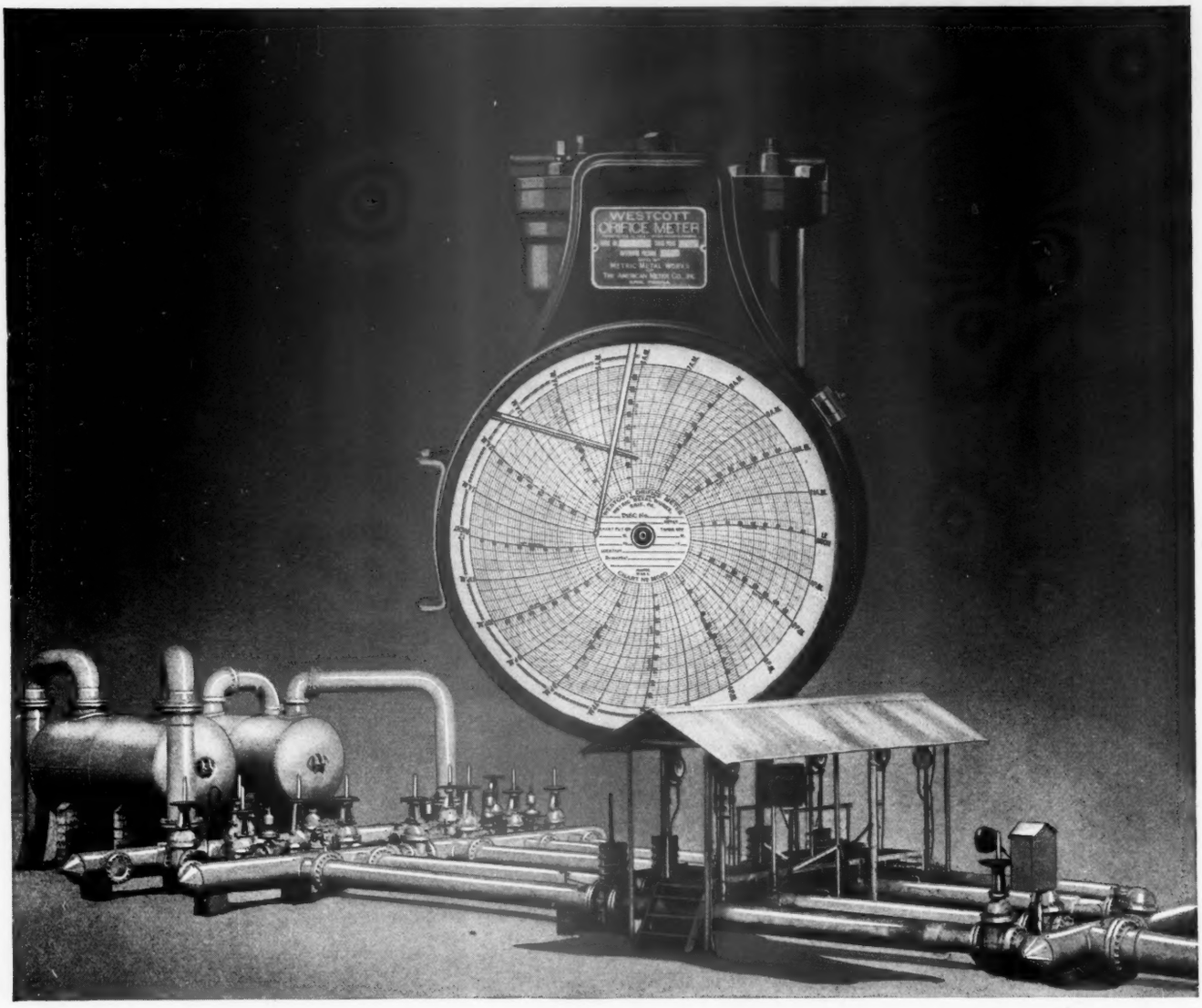

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Editorials

Jack of All Trades

LARGE GAS companies with their corresponding large staffs of employees can well afford key men and their immediate assistants who become more or less specialists at their particular tasks. However, due to a more proportionately smaller income the little companies must make a shift to the end that one key man must direct several important activities.

From the standpoint of small company management this status is ofttimes considered a curse, because it is by no means an easy matter to select and keep satisfied key men who possess more than average versatility; but, from the employee angle, the matter might be deemed a blessing, especially when it is considered that the saddling of several important key tasks on one individual's shoulders constitutes an education in gas procedure that does not in all cases present itself in the larger gas organizations. Indeed, in advising the young man who is seeking a vocation in gas work and is undecided whether to enter the employ of a large or small company, we would emphatically urge him to cast his lot—at least as a starter—with the latter organization. We believe, by such a procedure, he would be less apt to groove himself in a rut, would become more mobile, mentally speaking, and would derive an education anent the workings of our industry more speedily.

As Mr. Weiser brought out in his paper before the recent meeting of the New England Gas Association, the key men—or better yet, the key *man*—must literally be a jack of all trades if he is to be of any value to his company. In addition, he must know to a nicety the factors, especially the small ones, that determine whether the company is operating on the profitable or unprofitable side of the ledger. Once he masters this sense of value so that it becomes almost a second nature with him he is "going places" and it usually will not be long before he begins appreciably to ascend the ladder of success; by and large, big companies are ever on the lookout for such individuals.

Water Heater Accessories

THE MOVE to install distant control on circulating or "side arm" gas water heaters is full of common sense when one considers the financial straits of many of our customers. Further, as has been abundantly brought out by those who have enjoyed some success in marketing this accessory, this activity does not mean that the sale of automatic gas water heaters has been consigned to the ash heap. But ordinary acumen tells us that many folks cannot afford the price of an automatic heater and, indeed, many who already have such an appliance operate them by hand—we have seen it done; that is, they light the automatic water heater for a certain length of time and then turn it off.

Those who cannot scrape up the price of an automatic heater certainly would consider installing a distant control—and perhaps, when times get a trifle more lush, many of them would be partially educated up to the point where selling them an automatic unit would not involve quite so much effort on the part of the gas company salesmen.

Obviously, one possible difficulty that might arise in connection with the use of distant control on the circulating gas water heater is that of backfiring. However, in view of the fact that a number of companies have successfully marketed this device it is patent that these companies have looked into the relation of the size of burner ports, amount of gas consumption and the location of the pilot and satisfactorily solved the problem.

We mention this point because, some twenty-four years ago, your editor went through the throes of testing a small thermostat to be installed on a circulating water heater in order to make the same automatic, and he well recalls the persistent headaches caused by backfiring after a number of the thermostats had been installed on customers' premises.

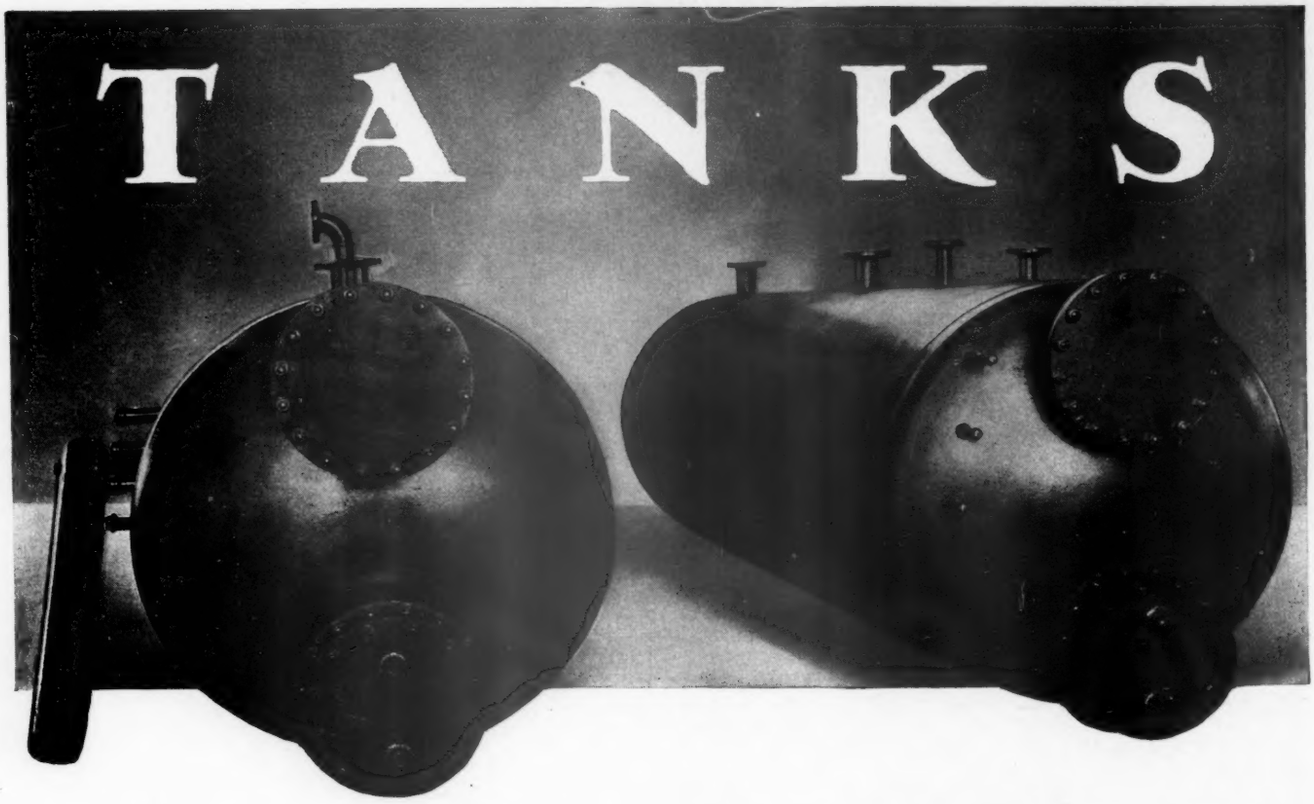
The Ultimate

IF all the talk, hearings and agitation relative to utility rates, officers' salaries and the like don't leave in the mind of the business man of only average intelligence the thought that it is, after all, a farrago of nonsense, we miss our guess. Let's see how the customer would profit if we went the limit. Let's assume every employee of a utility goes berserk in a philanthropic brainstorm and decides to work for nothing. Indeed, let's assume an outrageous ultimate wherein a gas company would get its raw materials for nothing, as well as being served free with every item that is necessary to furnish good service—and in addition, would wax super philanthropic by way of digging down and paying to the various principals the taxes that now obtain. By such Utopian magnanimity the customer would get his gas for nothing and, in many of our large cities, he would be three dollars and fifty cents to the good each month.

This would keep his family in shoes per year, plus a shirt of doubtful quality and an imitation silk necktie —that is, if he didn't have to furnish a portion of the dole necessary merely to feed the aforesaid philanthropic gas company employees and the public service commission staff; because these latter folks would doubtless be out of jobs, there then being nothing to claw over and legislate about.

Henry M. Riley

Editor



One of the catalogues published annually for purchasing agents contains 55 pages of names in small type, of companies that build tanks. Which means that you can give any of an unlimited number of constructors your specifications and they will build you a tank.

SEMET-SOLVAY ENGINEERING CORPORATION has built tanks of many types and sizes for years, mostly for public utilities and the process industries, using numerous kinds of metal and alloys.

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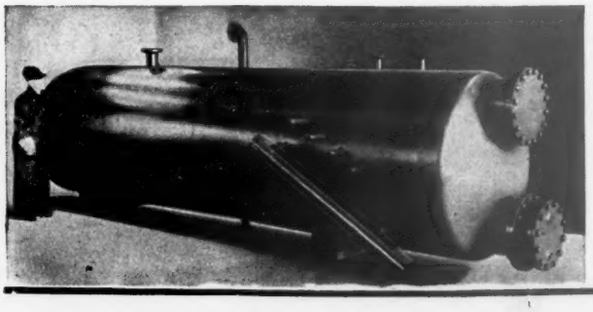

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AMERICAN GAS JOURNAL
March
1934

Kitchen Planning Ally

With Giant Posters as the Central Motif in Their Window Display One Company Inexpensively and Effectively Emphasized the Vital Role of Gas Appliances in Planning for Better Kitchens

By STUART BRATESMAN

Manager, Display Department, Boston Consolidated Gas Company

OF late there has been a decided swing towards featuring the planned all-gas kitchen idea to sell gas appliances in the industry. This much neglected phase of institutional and merchandising advertising is finally receiving its just reward. Previous to this, little attention has been given kitchen units, except in the larger gas companies.

Manufacturers are playing up the modern kitchen theme in their national advertising, whether they be gas appliance people or not. If their product can be used in the kitchen, they have illustrated their advertisements with models, and backgrounds of model gas kitchens. A recent issue of the Saturday Evening Post had quite a few layouts along these lines. Floor wax, monel metal sinks, soups, kitchen utensils, etc., all came in for the gas kitchen treatment.

It seems to me that with all this national publicity to help push over the gas kitchen idea, the gas company that launches a really effective program of kitchen advertising has a pretty good chance in greatly im-

Photographic enlargements were the central feature in these Window Displays

proving not only its gas appliance sales, but the general good will of the public as well. Anything that we can do to educate the public to the fact that gas is *not* the fuel of yesterday, as our electric brothers would have people believe, but a proven service that is as modern as tomorrow, should be stressed as much as possible. Driving home the modern gas kitchen theme is one method of doing this.

Now, just how does the average gas company window fit into this picture? One of the important educational media the gas company possesses is its windows. All day long people from every walk of life pass them. They are "on display" 24 hours every day in the year. This valuable space can be utilized to help put over the modern gas kitchen theme. Let's see what one eastern gas company did with its windows, along the kitchen planning idea.

It was decided, at the outset, to treat the series of downtown windows of the company as a complete unit on the kitchen subject, instead of separate themes in each window. As subject matter the three major selling points of the gas kitchen were selected: the gas range, the gas refrigerator and the automatic gas water heater. Three displays of this series are reproduced with these lines. In designing the series careful attention was given to the balance of the set-up as a whole, the uniformity of copy, illustrations, color and lettering faces, and the relation of one design to the others. You will notice, upon close study, that the copy varies slightly in each set, but the family resemblance is there in all.

The Hot Water Message Brought Home

Instead of the usual bold poster type of illustration generally associated with gas company window displays, it was decided to use giant enlargements of photographs taken in the actual model kitchens in the various company offices. We took the pictures ourselves, using Home Service girls as models. The usual procedure in obtaining copy of this type is to buy it outright from a large photographic house. We did the whole job, except the enlargements, without any previous experience in this type of posed photography. There are minor flaws, but the whole job stands up.

This series of photographic reminders as to the speed, economy and silence of the modern all-gas kitchen gave the passerby a complete story all in one spot—at one time. All he had to do was to go from one window to the next. After the displays had been in the downtown office for about two weeks they were routed through the branch office window system, in rotation. This tended to give the story to all the city, instead of one isolated spot. The series also tied-in with the company newspaper, direct mail and Home Service publicity on the subject. The actual cost of the series, for your own information, did not exceed $150.00.

Try a series of kitchen window displays in your own windows. From the information set down in this article you should be able to turn out something effective. If you desire additional data write the author. But, make an honest attempt to sell the public the all-gas kitchen idea in your windows!

Handling a Delicate Matter

IN just what tone to address its public in its institutional advertising series the morning after a serious pipeline break had cut off consumers for hours was the delicate question that confronted officials of the Memphis Natural Gas Co. and its advertising agency, Lake-Spiro-Cohn, Inc., of Memphis, the first week in January.

Thursday morning, January 4th, at 5:30, a weakened section of the company's 447-mile pipeline near Tunica, Miss., blew out. By 12 hours later, the break had been repaired and normal pressure restored, but meanwhile Memphis newspapers had clarioned the break in flaring headlines, despite the fact that the company's emergency gas-making plant had given most Tennessee consumers partial service nearly all day.

Far from crying over spilt milk and magnifying the proportions of an unavoidable accident through apologies, the company's admen next day promptly seized on the incident as a way of proving to present gas consumers and prospects alike the real value of natural gas,—through the lack of it for a few hours.

Caption on the ad, run in 1050-line space, referred to the "disaster" as "a short pause in 43,900 hours of carefree, unceasing, untroubled service," followed by the old proverb, "Nothing is ever truly appreciated until we have to do without it."

Copy went on to plug the enormous value to Memphis and the 40 other Tennessee, Mississippi, Arkansas and Louisiana towns served by the company of the continued, unfailing service since the pipeline's completion on Jan. 1, 1929.

"We do not go back to horses and buggies, when the starter on our car fails to work on an icy morning," the ad significantly continued. "We do not yearn for oxcarts if perchance railroads are cut off for a few hours. For every airplane that has fallen, a thousand more have been built to fly the airlanes. That is progress."

Favorable reaction to the ad included a first-column editorial quoting and reiterating its message in the Memphis Press-Scimitar, a Scripps-Howard newspaper, two days later.

The Memphis Natural Gas Company launched its first advertising to consumers in December through Lake-Spiro-Cohn, Inc. All natural gas copy run in Memphis and its territory previously has been carried by local utilities which distribute the gas at retail to the public.

The current campaign is being directed by Bernard L. Cohn and written by John C. Ottinger, Jr., of the Lake-Spiro-Cohn organization.

Gas Heating Calculations Simplified

Part III—Warm Air Heating—Wherein Are Also Presented Some New Data on Conditioned Air Heating

By O. J. KUENHOLD
Gas Heating Engineer, Forest City Foundries Co.

Gravity Warm Air Systems

THE heat carried into a room per sq. inch of basement leader area is proportional to the velocity of the air and the difference in temperature between the supplied air and the air which either escapes from the room or is returned to the furnace. The velocity of the air circulation, being induced by the difference in the weight of supplied and returned air, is dependent upon the elevation of the warm air registers above the furnace. The register discharge temperature which is universally accepted as giving best results is 175 degrees. For this register temperature, the Btu. delivery per sq. in. of leader pipe area, leader velocity, and cubic feet of air per hr. (measured at room temperature) will be as shown by the table below:

	Btu's per sq. in. hr.	Velocity in F.p.m.	Cu. ft. per hr. per sq.in. @ 70
First Floor	105	150	52.5
Second Floor ..	170	245	85.5
Third Floor ...	208	300	105.0

The above assumes air escape or return temperature of 65 degrees at the return grille. This results in 3 air changes per hr. in zero weather for an "average" room, which is a room having 6 Btu.'s heat loss per cu.-ft. of room contents. All the above factors reduce downwardly as less than 70 degrees of room heating is done.

Required Leader Area—The calculated area for round tin basement leader pipes can be found by dividing the room input required to maintain designed room temperature, by the Btu.'s per sq.-in.-hr. in the table. The leader areas thus found should be increased to compensate for loss of air temperature, and hence velocity, due to extra leader length, by adding:

3 sq. ins. for each ft. of uncovered pipe over 8 ft. long.
2 sq. ins. for each ft. of well covered pipe over 12 ft. long.

In addition to this correction for length, add 1 sq. in. to the area for each 10 angular degrees and horizontal turn—not counting the upward turn into the riser. Thus, for 90 degree turn, add 9 sq. ins. The resulting area after making the above two corrections is called the "corrected leader area." Use the nearest size in even inches—but never less than 8" diameter leader. For pipe covering use only air cell asbestos as paper covering is worse than useless.

Required Wall Riser Area—The "effective area" of second and third floor wall risers should not be less than 60 per cent of the corrected leader pipe area, but add about 8 sq. ins. for each right angle turn in wall piping. To find final riser dimensions, divide the "effective riser area" by ½" less than the available inside riser depth. The result will be the actual inside riser width. Little is gained by increasing riser area above 60 per cent of leader area.

Register Area—The free or "net" opening through registers should equal the corrected leader area. Locate all warm air registers in inside walls so that the runs will be as short and direct as possible.

Furnace Location—Locate the furnace so that the runs to most important rooms will be of approximately equal length but favoring runs towards the prevailing winter wind side of the house.

Return Ducts—Every gravity warm air system should have at least one centrally located return duct and preferably more than one. The tighter the house and the more liberal the warm air duct areas, the more important is adequate return duct area. The total area of return duct should at least equal the total leader areas. They should discharge into the furnace casing below grate level and in such a way that the air will be equally distributed to the heating surfaces of the furnace; otherwise, air rotation will take place within the furnace, resulting in unequal warm air distribution. Return ducts should not be exposed to heat radiation as this sets up counter currents.

Free Air Circulation—The resistance to air circulation in a warm air heating system is made up of the resistance in the furnace itself (in-

ternal resistance) and the resistance in the ducts (external resistance). The total allowable resistance is limited and if the air flow through the furnace is not free and direct, difficulty may be encountered in causing circulation through the longer ducts. The duct connections at the furnace should be made so as to offer least resistance and so that each duct is filled by a proportional part of the cross sectional area of the heating surfaces of the furnace, to secure balanced circulation.

Booster Fans—A propeller blade fan will often help to a surprising extent to overcome violations of the foregoing rules and to stimulate natural circulation, but it cannot build up air pressure to overcome glaring defects of duct lay-out and area.

Required Furnace Capacity—To the room input required to maintain design temperature, add a furnace selection factor as follows:

50% if ducts are covered with air cell asbestos.
60% if ducts are bare or covered only with paper.

The furnace input times actual efficiency (input less flue loss) should be at least equal to the above sum. The selection factor includes 20 per cent reserve capacity (which is ample for residences) and allowance for heat emission from the furnace casing and leaders. It is assumed that the top of the furnace is well insulated and that the casing has no undue heat loss.

Conditioned Air Heating

Conditioned air heating systems represent the highest development in warm air heating and in fact in any method of heating homes. They include main warm air ducts and branches to all rooms, as well as branch return ducts and mains. The circulating air is positively propelled through this system by means of an electric centrifugal blower. At a central point the returned air is washed or filtered, warmed and healthfully humidified. The returned air removes all floating dust particles from the rooms and the moderately warmed air, supplied in liberal volume, constantly pours freshened, hygienically cleansed and humidified air into all parts of the house.

The keynotes of this most modern of all systems are cleanliness, health, rapidity of response and evenness of warmth distribution. The use of coal for fuel does not harmonize with these keynotes and conditioned air heating attains its best only with gas as the fuel. The coming of conditioned air heating is therefore supremely important to the gas industry.

There are many differences in the fundamental principle of air circulation in forced air heating systems compared to gravity systems. These can best be set forth with the aid of the Forced Air Heating Table which reduces all needed calculations to the greatest simplicity and rapidity.

Air Volume—The cubic feet of air circulated per effective sq. in. of riser area is of course proportional to the riser velocity. Riser velocities in ft. per min. are listed at the left of the table and the air delivery in cubic feet per hour per sq. in. of effective duct area measured at outlet temperature, are listed at the right side of the table.

Air Changes—The air discharged into a room from a warm air register must carry sufficient Btu's into the room to maintain it at design temperature. It is obvious that a room having large glass and wall exposure compared to its cubic contents will require more air changes per hour to warm it than a room having small Btu. loss per cubic ft. of contents. An average room has 6 Btu's loss per cu. ft. of contents. The number of air changes which occur when any "average" room is warmed to 70 in zero weather depends entirely upon the temperature of the air discharged into the room. The Forced Air Heating Table gives a scale of register discharge temperatures across the top and opposite these at the bottom is listed the air changes occurring when the room is warmed to 70 in zero weather.

FORCED AIR HEATING TABLE

Btu. per Effective Sq. In. Riser ↘	Register Discharge Temperature 125°	130°	135°	140°	145°	150°	155°	160°	Air Return at 65° Assumed	
Riser Velocity in Ft. per Minute 1	.411	.442	.472	.502	.531	.559	.587	.615	.417	Cu. Ft./Hr. per Sq. In. @ Register Temp.
300	123	132	142	150	159	168	176	185	125	
320	132	141	151	161	170	179	188	197	132	
340	140	150	160	171	180	190	200	209	141	
360	148	159	170	181	191	201	211	221	149	
380	156	168	179	192	202	212	223	234	157	
400	164	177	189	202	212	224	235	246	166	
420	173	186	198	212	223	235	247	258	174	
440	181	194	208	223	233	246	258	271	182	
460	189	203	217	233	244	257	270	283	191	
480	197	212	227	243	255	268	282	295	199	
500	206	221	236	254	265	280	294	308	207	
C.F.M./sq. in. @ 1 FPM	.377	.374	.371	.368	.365	.362	.359	.356	V	Air Volume at 70°
Air Chg. Factor	.918	.847	.786	.734	.688	.647	.611	.579	$\frac{V}{H}$	
Avge. Air Chgs/Hr.	5.5	5.1	4.7	4.4	4.1	3.9	3.7	3.5	$\frac{6V}{H}$	

Limitations to Air Circulated

The volume of air circulated by a gravity system is limited by the natural rise of warm air to about 3 air changes per hr. for "average" rooms, corresponding to 175 degrees register temperature. In forced air circulating systems any desired number of air changes per hr. can be attained. The greater the air changes, the fresher the room air; the lower the register discharge temperature, the more even the heat distribution from floor to ceiling. However,

little is gained by employing more than 4.4 air changes—which corresponds to 140 degrees register discharge temperature as shown by the table. This register temperature is recommended for residence heating.

Riser Areas—It is obvious that the more heat delivered into a room per sq. in. of riser area, the smaller the riser area may be. In a forced air system designed for low cost, the riser and duct sizes are reduced by resorting to excessive register temperatures or duct speeds, or both. Good engineering requires that the risers should be of as large areas as can conveniently be accommodated in the stud spaces of standard walls. Experience shows that, for single thickness risers, about 200 Btu.'s per sq. in. is the practical limit and for double thickness wall risers about 240 Btu.'s per sq. in. Referring to the table we find in the 140 degree column that at 400 F. P. M., 202 Btu.'s per sq in. of effective duct area will be delivered into the room and at 480 F. P. M., 243 Btu.'s per sq. in. These riser velocities are recommended respectively for single and double risers.

Single risers are almost universally used for conditioned air heating systems. The adjacent studs are insulated with air cell asbestos strips tacked on and fire-proof board is used as a plaster base over the risers.

Required Riser Sizes—Divide the But. room input required to maintain design temperature, by the Btu. delivery per sq. in. of riser area. The result will be the effective riser area required. The actual riser width is found by dividing the effective area by ½" less than inside riser depth, but before finally deciding upon the final riser dimensions correct the area for air friction, etc., as follows: Pick out the horizontal runs from the furnace which are longer than average. Add 1 sq. in. for each extra 10 ft. of run and for each 90 degrees of turn, including turns in the wall duct. Minimum inside radius of turn—3".

Cold Air Returns—As much larger air volume is circulated in well engineered forced air heating systems than in gravity systems, it is necessary to have a cold air return duct or a cold air relief duct from every room except small lavatories and unimportant third floor rooms. Relief ducts are extended from bath-rooms and large lavatories through a cold air grille at the floor leading to studding space in an inside wall near the outer wall. The studding space is left clear so the cooled air may be vented into unused attic space under unplastered roof rafters on the leeward side of the house. The relief duct and register should have at least 50% greater area than the warm air duct and register.

All other rooms except the kitchen and attached garage have return ducts using stud and joist spaces as return ducts. Stud spaces so used must be covered with smooth plaster board base. The spaces used for cold air return lead into metal main ducts which lie below and cross the joists. Under no circumstances should air be returned from a garage room, because of gasoline and monoxide odors and hazards. Provide cold air relief for garages.

Locating Registers—In forced air heating systems the location of cold air grilles is of supreme importance. They should be located at outside walls near the largest glass exposure on the windward side of the room. Under no circumstances should it be necessary for cold air to cross a floor to reach a return grille. Their important function is to get cold air out of the room as quickly as it forms. Warm air registers will warm the room no matter where located, but to have a compact basement duct system, locate warm air risers toward the center of the house. Do not hesitate to locate registers 6½ ft. above the floor where they will dodge furniture—especially in bed-rooms and the kitchen. Avoid placement of warm air risers in outside walls. If unavoidable, insulate all except the inner side with 2 ply air cell asbestos and add 15 per cent to area of riser for each 10 ft. of exposed length to compensate for heat loss.

Balancing Cold Air Return System—The area of the return duct for each room should equal the area of its warm air duct except—distribute to return ducts of windward rooms additional return duct area totalling the area of warm air ducts of all rooms (except garage) which have no return duct. The total return duct areas will then equal the total warm air duct areas except for the garage. To balance the garage duct take an outside air intake duct from leeward or neutral side of the house into the return main near the furnace. Its area should equal that of the garage warm air duct.

Garage Room—Calculate garages on a 70 degree basis, less an amount not to exceed 30 per cent, to provide warmth above freezing in extreme weather during the night when the outdoor temperature is down and the house temperature is maintained at 60. The necessary capacity so provided, and the added fact that cold air must be taken from outdoors to balance the warm air to the garage, almost quadruples the cost of heating garage space by extension from the main system. A thermo-controlled independent garage heater is preferable, even in a coal fired central system. This generally results in a more compact system for the house. Do not guarantee air circulation to an attached garage when heated from a main plant, unless cold air relief is provided and the garage doors are either very tight or face to leeward.

Trunk Line System—In small houses individual warm air ducts may be employed, but in larger houses trunk line systems have less air friction and generally work out best. No upward pitch is required for the ducts. All curves must have liberal radius and all junctions must have dividing dampers with locked quadrants. All branches should in addition have throttling dampers preferably pivoted at the bottom of the duct and pointing in the direction of air flow.

Converted Gravity Systems—The conversion of gravity systems to conditioned air as well as to gas fuel may help to sell gas heating. To determine best duct speed and temperature, calculate the heat losses of second floor rooms; divide the heat loss of each by its effective riser area; select the riser having highest Btu. delivery per sq. in. as a base; pick out its needed riser velocity and temperature from the chart which will give ample air changes without excessive riser velocity. This velocity and temperature will overheat

(Continued on page 38)

Notes on High Pressure Gas Distribution

The Author Treats of the Effect of Expansion and Contraction on Pipe Lines and a Consideration of the Influence of Temperature. A Brief Outline of Expansion Joints Is also Set Forth

By **DISTRIBUTION ENGINEER**

(Continued from February issue)

IT is unnecessary to compute every main on the distribution system, as the maximum distance possible to run the minimum size of main may be determined for different sections and any distances under this are immediately assumed as of minimum size. A maximum length for different sections of a distribution system is determined because of the variations in the concentration of consumers. In the concentrated building sections, tie-ins may provide ample capacity for long lengths of minimum size but the more difficult streets to design occur in the long stretches of roads on the outskirts of a village. Assuming the load to be uniform and a building to exist on the average for every sixty feet of main, which would be an exceptionally high average for the residential sections of villages, there would result 176 consumers on two miles of length and with an individual demand of 20 cubic feet per consumer the total necessary quantity would be 3520 cubic feet per hour. From the results as given on page 18, January issue, it will be seen that a two-inch main would be ample. However, if laterals are to be taken off in the future or initially along this two mile stretch, the more economical design would be one using the minimum size of main but making provisions for some future reinforcement such as a tie-in with other distribution mains or the sub-transmission main. The tie-in should not be provided initially, as there is no way of determining how many of the potential consumers will actually take service and whether their demands will equal those used in the initial design. Deferring the reinforcing to the future is good policy, as there is the probability of its being unnecessary, but if eventually essential, the spreading of the capital investment over a period of years is an economy. If the consumer concentration averages one-hundred feet of main per building, there would be only one-hundred and six prospects along a two mile length of main and the quantity required would equal 220 cubic feet per hour peak demand at twenty cubic feet per consumer, which would allow considerable excess capacity for extensions to supply additional consumers in the future or an increase in the average consumers per mile of main.

Bridge on which a six inch main is exposed for a distance of 164 feet. The ends are free to move in the abutment walls, not being concreted in. No expansion joints are used.

When determining the number of potential consumers, each street will offer an individual problem. For instance, if there are a number of estates actually existing and each adjoins a developed estate, it would be sufficient to take as the number of consumers those actually existing, while in an active development a normal increase must be provided for. Local conditions are too variable to establish set rules. A number of designs on low pressure have assumed

that there will be eventually a consumer to every lot. This practice is the extreme in providing for the future and has no justification unless results in the more concentrated building areas of the village indicate that such an assumption will materialize. The opposite extreme is providing for only the buildings which actually exist at the time of the field survey. While this is the minimum extreme, there is an economy in providing for only the existing buildings and allowing for future increases by ample provision for additional tie-ins or connections to the sub-transmission main. There is also the advantage to this practice that should actual saturation occur slowly on the system, the installed mains will provide sufficient service over a period of years. By deferring tie-ins or loop lines their size can more closely approach the actual demands of the consumers rather than those assumed during the initial design and many streets will not require the reinforcing originally contemplated, thereby decreasing the grand total of investment.

Value of Census Statistics

The only generally available figures for the percentage which should be added to the existing number of buildings are census statistics indicating the growth of population in the territory. Such a factor should be carefully used as it is seldom that the number of buildings increase in the same proportion as population, also the rate of building increase is not uniform being rapid in times of prosperity and practically nil during depressions, although the population increase will be steady during both periods in many territories. The recorded rates of population growth near such centers as Chicago and New York have been 100% to 120% for some counties, with 50% to 75% a common figure. A method of providing for loads resulting from this population increase is to retain the minimum size of main as two-inch but increase the size of sub-transmission main to provide sufficient quantities for any period of time selected. This increases the initial investment only slightly due to the small comparative length of sub-transmission mains. Tie-ins on high pressure distribution systems are not as frequent as on low pressure and are minimized by proper design of sub-transmission mains. There is also the possibility that the sub-transmission main pressures may be increased above that desirable on the distribution mains and the distribution fed through line regulators thus providing greater quantities at higher pressures to distribution mains. When designing a system this contingency should be provided for by having as few laterals as possible taking off from the sub-transmission main to minimize the number of line regulators which might be required.

Effect of Expansion and Contraction—Experience, especially in steel mill practice rather than any theoretical studies, has brought about the wall thicknesses commonly used today. Recently there have been experiments with lighter walled pipes of which a considerable mileage has been placed in service. That the thickness previously used was a conservative, safe practice is indicated by the lighter walled pipe withstanding normal service for a number of seasons without failures. All discussion of pipe will be confined to the standard specifications outlined by the American Petroleum Institute, under Grade A for quality, and Standard and Lightweight for thickness, due to their almost universal use on sizes adaptable to high pressure distribution. Theories of pipe strength confirmed by experience may be readily applied to any of the other common metals or alloys intended for gas mains and indicate their ability to resist the combined stresses to which they will be subjected in sub-surface gas use.

Sub-surface lines are subjected to a variety of forces most of which are indeterminate and must be provided for by safety factors. While the law of averages would apply to the various forces acting upon a buried line making a numerical total of all types at any one instant highly improbable, computations to provide safe working limits for wall thicknesses usually assume that all do occur at a particular instant.

Temperature Stress

The most widely discussed stress to which sub-surface structures are subject is that due to temperature changes. The formula for the increase in length due to temperature chaanges may be expressed as follows:

$\Delta = 12kL\ (t_2 - t_1)$

Δ = Increase in length in inches. If desired in feet, omit 12.

L = Length of line in feet at temperature t.

t_1 = Initial temperature of material in degrees F.

t_2 = Final temperature of material in degrees F.

k = Average coefficient of linear expansion in temperature range, t_1, t_2, expressed in the fraction which a unit length will change for each degree F. For ordinary steel it has usually been taken as 0.0000065, although more recent studies of the U. S. Bureau of Standards gives the value of 1/145000 or 0.000006897. Some common coefficients of linear expansion are:

Copper	0.0000096
Cast Iron	0.0000058
Wrought Iron	0.0000068
Steel:	
Carbon	0.0000065
Annealed	0.0000061
Chrome-nickel	0.0000065

These coefficients of expansion are constant in a small range of temperatures but actual tests have indicated a rather wide variation on commercially similar pipe grades with slight differences in chemical or physical characteristics and manufacturing processes. For practical purposes, however, the wide variations considered from a strictly theoretical viewpoint are negligible, as the field measurements of length and temperature can not be made with sufficient precision and results are expressed only to the nearest 1000 pounds unit stress.

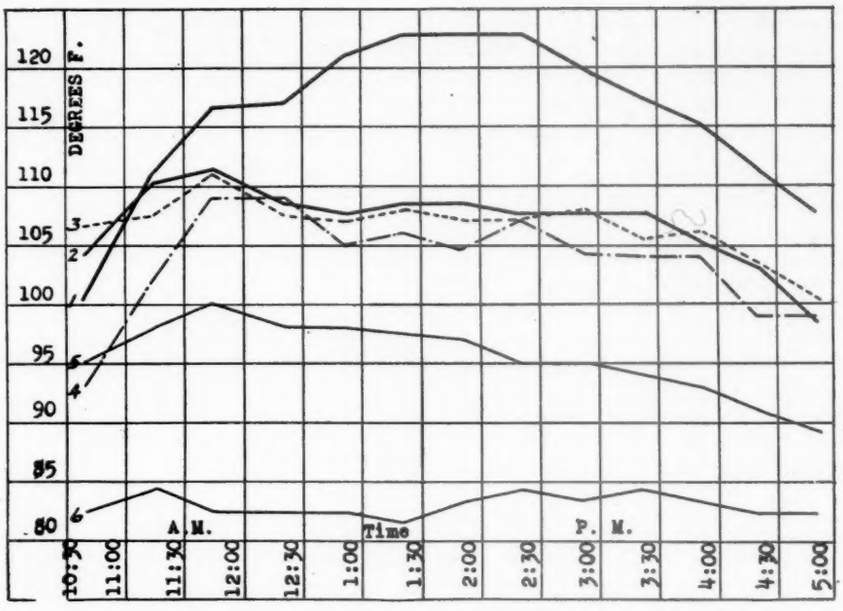
Assuming 100 degrees for the $(t_2 - t_1)$, 5000 feet for L, 0.000006897 for k,

$\Delta = 12 \times 0.000006897 \times 5000 \times 100 =$ 41.382 inches.

Expansion Compensation

An actual movement even in a mile of main of 41 inches would result in damage to take-offs, whether services or mains. If the actual movement occurred in only 1000 feet of length instead of a mile, the differential in length would be 8". In 1000 feet and only 25 degrees change in temperature, the differential in length would be two-inches, which would still be sufficient to cause material damage and leakage in the main. It can be assumed from these figures that such changes in length are practically nonexistent; therefore, actual expansion does not take place, being restrained by the gripping power of the earth, fixed ends which result from the existence of bends, tees, take-offs or snaking of the main and slight movement of the main in a plane at right angles to the axis of length.

The gripping power of the material surrounding a main is the most common and effective of all the factors acting to restrain actual movement of the main. Tests on mains from 200 to several thousand feet in length have indicated that the actual total movement as measured would be equivalent to that computed as produced in from 75 to 175 feet of unburied line. The difference between the measured expansion and the expansion possible for the total



Temperatures of pipe exposed to direct sunlight and no wind in the southern part of New York State.

Curve 1—Surface of bare 4" steel pipe.

Curve 2—Outer steel surface of pipe coated with an inhibitive type coating and wrapped with a fabric impregnated with the same type.

Curve 3—Outer steel surface of 2" pipe coated with an inhibitive type coating but no wrapper.

Curve 4—Thermometer in 4" pipe near inner surface but not touching steel.

Curve 5—Inner steel surface of 2" pipe coated with tar base enamel wrapped with asbestos to which an extra coating of enamel had been applied and an outer wrapping of Kraft paper.

Curve 6—Atmospheric temperature in direct sun.

length of main as computed was restrained by the gripping power of the ground, which in the test cases consisted of sand, sandy loam, cinder fill and loam, each giving approximately the same results. Clay or similar soils may have additional restraining power. The restraining power of the ground was evident from the fact that the lines being tested varied from 200 feet to over a mile in length and the amount of expansion measured was small compared to that which the formula indicated should have occurred. Since actual movement did not occur, the forces resulting from temperature changes must have been counterbalanced by internal stresses in the metal. While the transverse movement of the main would have acted to lessen the internal stress, for the purpose of design, it will be considered that the full force set up by the temperature change was counterbalanced by an equivalent amount of internal stress.

The maximum stress a change in temperature produces with both ends anchored is:

$$\frac{P}{A} = kTE$$

P = Total force in pounds.

A = Cross sectional area of pipe metal in square inches.

k = Coefficient of linear expansion.

T = Change in temperature of metal in degrees F.

E = Young's modulus of elasticity being 28-30 million for steel.

Solving with T = 100 degrees F.

$$\frac{P}{A} = 0.000006897 \times 100 \times 30{,}000{,}000.$$

$$\frac{P}{A} = 20{,}691 \text{ lbs.}$$

The cross sectional area of metal in two-inch standard weight pipe is 0.07 square inches.

P = 20,691 × 0.07.

P = 1448 pounds per square inch.

In this formula the temperature change is an important factor and one found to have wide variations with various localities.

Ground Temperatures—One hundred degrees was assumed as the temperature differential in the above determination of stress. Such a large variation would not ordinarily occur in a buried gas line but may take place between the time of burial and the minimum temperature to which the line would be subjected during the first or any winter. Proper construction methods minimize the effect of temperature. The temperature of an exposed line depends upon whether it is uncoated, or coated, the type of coating, wind velocity, atmospheric clarity, sunlight intensity, location of pipe so as to prevent or allow circulation, etc. During burial the pipe quickly assumes the ground temperature. The gripping power of the ground immediately following burial would be insufficient to prevent contraction and, therefore, the strain which might result from restrained contraction is relieved by the pipe shortening in length. The practical temperature differential causing stress would be that caused by the difference between ground temperatures immediately following completion of construction and the subsequent minimum temperature to which the line would be subjected. When buried at depths of two to three feet, as found in usual practice, the change in temperature between that when first buried and minimum temperature is considerably less than that occurring in the atmosphere above the trench.

Actual Temperature Study

One particular study, conducted in a northern state where frost depth during a winter of little snow varied between 12 and 18 inches except in occasional spots where it was deeper, showed a variation below the summer maximum at two feet of depth between 38 and 41 degrees F., while at three feet the variation was between 35 and 38 degrees F. during the coldest month. During these same intervals the gas temperature in a main with 30 inches of cover and similar frost conditions varied between 42 and 44 degrees F. below summer maximum.

A number of soil studies appear to indicate that in northern territories the ground temperature at the bottom frost level plus two feet additional depth does not vary with daily temperature changes and differs between the maximum and minimum temperatures during the whole year only 20 to 25 degrees F. For instance, when the frost penetrates into the ground to a depth of two feet the ground temperature four feet beneath the surface does not vary with daily temperatures but slowly increases and decreases with the seasons. In territories which seldom or never have frost the temperature differential between minimum and maximum is still less than the above at depths of three feet or more.

There is ordinarily a difference between the temperature of the ground surrounding a main and the gas

(Continued on page 36)

Improving Customer Relations

A Study of the Outstanding Causes for Bill Complaints and Suggestions for Satisfactorily Handling the Same and Thereby Building Friendly Relations

By FRANK L. HALLOCK

Chairman, Subcommittee on Improving Customer Relations Through Bill Investigations, American Gas Association

(Continued from February issue)

Satisfying the Customer in the Company Office or In the Home

IN Table No. 2 appear the results of a study of 15,102 bill investigations in one company, in which the number of investigations completed by the office employee is compared with the number referred to the district employee. In the summarizing of this table it is evident that 4,882, or 32%, of these cases were satisfactorily completed in the office, while 9,871, or 65%, were referred to the investigator who visited the customer's home. Outstanding cases of successful handling are "Customer did not realize period of bill," where 94.6% were satisfied in the office and "Customer attempting to delay credit action" of which 83% were properly analyzed and stopped by the contact employee.

Customer's Stated Reason for High Bill	*Compl. in Office*	*%*	*Referred to Dist. Invest.*	*%*	*Number For Test*	*%*	*Totals*
1. Usage less—bill same	398	39.5	455	45 0	157	15.5	1,010
2. Normal usage—bill increased	2,420	22.6	8,012	75.5	178	1 7	10,610
3. Bills differ from neighbor	477	64 1	268	35 8	4	1	749
4. Did not realize period of bill	629	94.6	35	5.4	—	—	664
5. Bill never varies	379	65.1	197	34.0	6	.9	582
6. Customer delaying credit action	125	83.0	25	16.9	1	1	151
7. Claims inaccurate index	382	34.6	721	65.4	—	—	1,103
8. Domestic appliance poorly adjusted	60	35 3	108	63 5	2	1 2	170
9. Commercial appliance poorly adjusted	—	—	7	—	—	—	7
10. Hotel & restaurant appliance poorly adjusted	—	—	1	—	—	—	1
11. House heating appliance poorly adjusted	—	—	1	—	—	—	1
12. Misled by sales force	—	—	4	—	—	—	4
13. Misled by service force	—	—	1	—	—	—	1
14. Misled by advertising	—	—	—	—	—	—	—
15. Leak due to company negligence	4	11 7	29	85 3	1	2 9	34
16. Others negligence	8	53 4	7	46 6	—	—	15
17. Billed on improper rate schedule	—	—	—	—	—	—	—
Totals	4,882	32%	9,871	65%.	349	3%	15,102

Table 2—Percentages of High Bills Satisfied on First Contact with the Customer; Referred to District Investigator; and Referred Direct for Meter Test

In Table No. 2 appear this company's figures on the number of cases where meter tests were necessary. In this company during the period studied 3% of all requests were so handled. It would appear further from the committee's studies that the State Commission test is seldom requested by the customer, the company test in most cases being accepted.

The study of bill investigations so far has indicated the need of a specialized group of trained men to handle this class of customer. The replies to the question study show that many companies have already recognized this need and are operating accordingly. A specialized group cover this work in 88%, a centralized clearing point exists in 77%, while special training for office help and district investigators occurs in 66%.

With the acceptance of a need for training the next question that occurs is "What shall we regard as important items in such training?" Following is a table of the results to our question study that reveal the general attitude on these points:

First place—Knowledge of operation and gas consumption of appliances.
Second place—Contact training.
Third place—Knowledge of commercial division procedure, billing, checking, etc.
Fourth place—Familiarity with the operation of meter.
Fifth place—Knowledge of rate structures.
Sixth place—Knowledge of company policy.

In training district investigators to study the operation of appliances it is felt that a division should be made between the large volume customer and the small volume or domestic customer. While the greatest number of cases occur in the latter classification, the most difficult problems as well as the greatest loss to competing fuels is naturally present in large volume users.

In selecting a man to handle complaints from large volume customers the prime necessity would appear to be sales-mindedness. This man must be able to re-sell gas to a customer who is on the verge of swinging from gas fuel to a competing product. Some of the necessary items of knowledge for this class of work are listed below as they apply to the

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three main divisions of large volume customers; House Heating; Industrial; and Hotel and Restaurant.

House Heating Customers

1. Knowledge of the customer's estimated cost of operation as quoted at time equipment was purchased.
2. Consumption of domestic equipment before installation of gas house heating.
3. Estimated cost of water heating.
4. Required and installed radiation.
5. What heating area the original estimate was based on.
6. What thermostat range was agreed upon.
7. Hours of operation of equipment.
8. Estimated and actual cost of operation for period of bill investigation.
9. Whether special recommendations made at time of installation have been carried out.
10. Local or personal factors involved.
11. Record of service or adjustments made by gas company.

Industrial Customers

1. General knowledge of appliances to be encountered and a specific knowledge of the agreements entered into by the salesman at the time of sale.
2. Record of service or adjustments made by the gas company.
3. A sales-minded approach to the investigation, so that the presence of obsolete and defective equipment may be noted and called to the attention of the sales force.

Hotel and Restaurant Customers

1. Ability to differentiate between a true excess consumption on the appliances and a complaint due to high operating costs in general caused by a decrease in business or in the profits of a given class of business.
2. Thorough familiarity with any appliance encountered.
3. Familiarity with possible variations in equipment that might be recommended to suit the actual needs of the customer which might have changed since the original sale.

Training the Investigator to Deal With Small Volume Customers

The small volume customer does not present the problem in training and technical knowledge as that of large volume work. However, rapid strides in the development of thermostatically- and time-controlled domestic appliances are making it necessary to give serious thought to a type of training program that will keep the bill investigators and office interviewers properly in touch with the latest developments. In a great number of companies no formal program is necessary, as the small group of investigators and office employees can readily be shown any new appliances as they appear on the sales floor. However, in the larger companies it is necessary to have a short training course where the men are given instructions at regular intervals. In addition to such training an information booklet, a sample sheet of which appears in Appendix "B," may be given to the men and supplemented as needed.

While a division has been created between the men who are to investigate large and small customers' complaints in so far as their appliance training is concerned, it is felt that the other items mentioned previously as necessary apply equally to both groups. Training in the fundamentals of customer contact has been treated in detail elsewhere and will not be described here.

It is general practice to conduct bill investigations from the department in the company that handles the customers' accounts, thus familiarity with its procedure is to be presumed among employees engaged in this class of work. However, when the new employee is being instructed and

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HOUSE HEATING NOTES

The estimated cost for house heating is based upon maintaining a room temperature of 70° for 16 hours and 55° for 8 hours daily. This is normal heating practice. *If other than normal temperature is maintained the Operating Cost will be increased as follows:*

Percent of Increased Gas Cost Above Estimated Cost When Heating at Other than Normal Temperatures

DAY TEMPERATURE FOR 16 HOURS

Night temperature for 8 Hours	70°	71°	72°	73°	74°	75°	80°
55°	Normal	3.06	5.94	8.88	11.8	14.8	29.7
60°	7.38	10.4	13.3	16.3	19.3	22.3	37.0
65°	14.8	17.7	20.8	23.8	26.7	29.7	44.5
70°	22.3	25.2	28.0	31.8	34.1	37.1	51.9
71°	23.7	26.6	30.2	32.6	35.0	38.6	53.4
72°	25.2	28.2	31.2	34.1	37.0	40.2	54.8

To use the above table, assume a desired temperature of 73 degrees for 16 hours during the day and 65 degrees for 8 hours during the night. Find 73 degrees column at top and 65 degrees column at left side. Where these columns cross 23.8 is found and represents the percentage of gas cost increase over normal.

Percent of Gas Consumption by Months

September	.....
October	5.3
November	11.9
December	18.1
January	20.1
February	18.2
March	15.8
April	9.2
May	1.4

GAS CONSUMPTION FOR HOUSE HEATING EQUIPMENT*

Bryant Steam and Water Boilers

4-W-253—133 Cu. Ft. per Hr.
5-W-253—167 " " " "
6-W-253—207 " " " "
7-W-253—250 " " " "
8-W-253—292 " " " "
9-W-253—333 " " " "
10-W-253—375 " " " "

Boiler Size	Series 43 & 45 Cu. Ft. per Hr.	Series 143-5 Cu. Ft. per Hr.	Series 443-5 Cu. Ft. per Hr.
3	306	334	367
4	408	445	489
5	510	555	610
6	612	667	734
7	714	778	856
8	816	890	978
9	918	1000	1100
10	1020	1110	1220
11	1122	1220	1344
12	1224	1335	1466
13	1326	1445	1586

6-63—1230 cu. ft. per hr.
8-63—1640 " " " "
10-63—2060 " " " "
12-63—2470 " " " "
14-63—2880 " " " "
16-63—3290 " " " "
18-63—3700 " " " "
20-63—4110 " " " "
22-63—4530 " " " "
24-63—4940 " " " "
26-63—5350 " " " "
28-63—5760 " " " "
30-63—6170 " " " "

Boiler Number

3 (S-A-W-CA) 2—107 cu. ft. per hr.
4 (S-A-W-CA) 2—143 " " " "
5 (S-A-W-CA) 2—180 " " " "
6 (S-A-W-CA) 2—215 " " " "
3 (S-A-W-CA) 4—234 " " " "
4 (S-A-W-CA) 4—312 " " " "
5 (S-A-W-CA) 4—390 " " " "
6 (S-A-W-CA) 4—468 " " " "
7 (S-A-W-CA) 4—546 " " " "
8 (S-A-W-CA) 4—624 " " " "
9 (S-A-W-CA) 4—702 " " " "

* These consumptions also apply when boilers are used for water heating.

DOMESTIC COOKING APPLIANCES

	CU. FT. PER HR.
Peerless Ranges	
Cabinet Oven Burners	22 per burner
Elevated Oven Burners	22 " "
Junior Oven Burners	25 " "
Double Oven Burners	22 " "
Giant Top Burners	20 " "
Regular Top Burners	15 " "
Other Ranges	
Giant Top Burners	22 " "
Regular Top Burners	17 " "
Regular Top Burners (Smoothtop)	18 " "
Simmering Burners	3.3 " "
Simmering Burners (Smoothtop)	4.5 " "
14" Oven Burners	38 " "
16" Oven Burners	42 " "
18" Oven Burners	46 " "
Elevated and Single Oven Ranges	
Baking	25 " "
Broiling	22 " "
Baking Oven Holding Consumptions (Average)	
Non-Insulated—350° F.	13.6 " "
450° F.	20.4 " "
Insulated—350° F.	11.2 " "
450° F.	15.6 " "

Appendix B—Sample Information Sheet for Office and District Investigator

when new appliances are being shown to the regular investigator it is felt that a description of such methods or procedures that may affect the customers' accounts should be explained to the investigator. Some of these are:

1—Methods of computing customers' bills.
2—Methods of securing history of service.

In giving the employee a course in training in the operation of appliances, the construction, testing and operation of the gas meter should be included. Cut-away models and actual assembly of levers and diaphragms will assist the investigator in gaining complete familiarity with this device which is mysterious to most customers.

Such information in company policy and in rate structures as is necessary can best be determined by individual company conditions; here we can only suggest that a frank and easily understood outline of policy and a description of rate structure will give the investigator a confidence in his work and an ability to answer questions that will greatly improve his prestige and his beneficial effect on public relations.

Checking of Errors

Closely allied to the training of employees is the problem of maintaining a reasonable degree of accuracy in indexing and in bookkeeping. The question study revealed that in addition to the universal auditing of all records, varying according to the accounting system used, an individual record was employed to check the accuracy of indexers in 13 out of 18 companies; a bonus system was used in two and no special check was employed in three. In maintaining accuracy among bookkeepers, individual records were kept in 15 companies; a bonus system was employed in two and no special plan in one.

Central Reference Point for Aggravated Complaints

In closing the study of practices in handling bill investigations it was asked whether or not aggravated complaints were referred to a central point for executive study. While the answers were affected by the great number of scattered small units under remote management, it is apparent that such a plan is in effect in about 50% of the companies reporting. It is felt that even though the local manager is undoubtedly best fitted to cope with his individual problems, such a study of aggravated complaints by a central executive point of control may be of great benefit in determining policies to correct conditions which may not be readily apparent to the local executive.

Suggested Principles

A suggested ideal plan for handling bill investigations can only indicate broad policies which are evident from the foregoing studies. Individual applications must necessarily follow the needs of the particular company and locality where the plan is applied. The following principles, however, may be considered as indicated:

1. Provision should be made for the pleasant reception of customers at a desk where they may state their case in private.
2. The employee taking the customer's statement should be a man, acquainted with any appliance the customer may refer to and armed with a knowledge of company policy, rate structure and human nature in general.
3. He should have readily available an accurate record of the customer's account for the past six months or year as needed.
4. If an investigation is necessary in the customer's home or business premises it should be referred to a properly trained employee who will call equipped with a record of appliance servicing, together with a statement of the customer's billings for the period in question and a similar period a year ago if possible. House Heating, Industrial, and Hotel and Restaurant cases should be referred to a specialized expert who contacts the Sales Division before covering the case.
5. If the customer telephones, the procedure would be as in Table 4.
6. If the customer writes, the procedure would be as in Table 4, in addition to which an acknowledgment would be promptly sent.
7. Routine reports in all of the investigations listed above would be reviewed by a competent supervisor, who would refer unusual or aggravated cases to the manager.
8. Service criticisms presenting aggravated complaints should be studied and referred together with a detailed report to the executive responsible for the department or for the group of local offices to which the complaint refers.

Table No. 4

Question Study: Analysis of Outstanding Causes for Bill Complaints by Territories and Description of Unusual Sectional Problems

New England Section

Variations in weather.
Coils in oil-burning furnaces cause large consumptions due to spasmodic behavior of furnace, load being borne by gas heater.
Range for space heating.
Families economizing by cooking at home, actually resulting in higher consumption.

Middle Atlantic Section

Customer attempting to delay credit action.
Families economizing by cooking at home, actually resulting in higher consumption.
Policy of encouraging customer to register complaints.
Unrealized wastage of hot water with automatic water heater.
Tendency to overheat houses, heated by gas.
Range for space heating.
Difference in rates between summer homes and city.
Difficulty in gaining access to read meters monthly in certain localities.
Negligent use of gas by disinterested parties.
Unforeseen seasonal variations.
Lack of knowledge of meter as a measure of gas consumed.
Lack of knowledge of gas consumption of appliances.
Appliances not properly regulated.

Central Western Section

Range for space heating.
Variations in weather.
Improperly adjusted pilots on oil-burning house heating equipment.
Varying length of billing periods.
Indexing errors.
Unfavorable publicity and political agitation.
(Local to section)
Change over to therm measure of gas.
Lower rates in adjacent territory.
Unlocked stoves in apartment laundries.
(Local to section)
Unemployment distress.

Southern Section

Variations in weather.
Range for space heating.
Poor house construction due to climate not justifying proper insulation.
Leaks in house pipes undetected with natural gas.
Negligent use of gas by disinterested parties.

Far Western Section

In the state of Colorado a large number of customers leave for summer cottages and do not close houses completely, resulting in gas consumptions being higher than anticipated. Unforeseen seasonal variations.

The following simple method of surveying the classes of complaints in any given company is suggested as a means of determining the principal causes of complaints concerning billing, together with an analysis of the relative success of the office and the

district force in satisfactorily explaining the consumption to the customer.

A form can be used similar to that appearing in Appendix "A." This form is planned to permit a tally of customers' complaints to be made by the clerk interviewing the customer. In the first section all interviews successfully concluded in the office are counted and classified; those referred for district investigation appear in Section two, while cases of meter tests referred direct from the office or from the district investigators, are tallied in the third section. The code number for each customers' statement of the cause of the complaint is entered directly on the work order. It is then possible to classify these complaints according to the actual results of the district investigation as they appear on the sheet entitled "District Record." This sheet further permits an analysis of such complaints to determine the percentage of satisfied or dissatisfied customers.

A further analysis may be made of the customer's attitude by employing a series of code numbers to indicate on the report exactly how the customer was left. Such might be:

1. Friendly and satisfied with the explanation.
2. Neutral and indifferently satisfied.
3. Grudgingly satisfied and persistent in complaints in spite of explanation.
4. Refuses to admit satisfaction because of definite views and antagonistic attitude.

OFFICE RECORD — APPENDIX-A — SHEET Nº 1

··· SURVEY · FORM · FOR · BILL · INVESTIGATION · STUDY ···

CODE	CUSTOMER'S STATED CAUSE	COMPLETED IN OFFICE	REFERRED TO DISTRICT INVESTIGATOR	REFERRED TO METER TEST	SUMMARY % IN OFFICE	SUMMARY % IN DISTRICT
1	USAGE LESS, BILL SAME					
2	NORMAL USAGE, BILL INCREASED					
3	BILLS DIFFER FROM WHOMADE					
4	DID NOT REALIZE PERIOD OF BILL					
5	BILL NEVER VARIED					
6	CUSTOMER DELAY. OBTAIN ACCOUNT					
7	CLAIMS INACCURATE INDEX					
8	CLAIMS DOMESTIC APPLIANCE POORLY ADJUSTED					
9	CLAIMS COMMERCIAL APPLIANCE POORLY ADJUSTED					
10	CLAIMS HOTEL & RESTAURANT POORLY ADJUSTED					
11	CLAIMS HOUSE HEATING APPLIANCE POORLY ADJUSTED					
12	SALES FORCE					
13	SERVICE FORCE					
14	ADVERTISING					
15	COMPANY NEGLIGENCE					
16	OTHERS NEGLIGENCE					
17	CUSTOMER CLAIMS BILLED ON IMPROPER RATE SCHEDULE					

DISTRICT RECORD — APPENDIX-A — SHEET Nº 2

SURVEY · FORM · FOR · BILL · INVESTIGATION · STUDY ···

CODE		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTALS
INVESTIGATORS REPORT																			
A	GAS CONSUMED AS CHARGED	SATISFIED																	
		DISSATISFIED																	
B	INCREASE DUE TO JEWISH HOLIDAYS	SATISFIED																	
		DISSATISFIED																	
C	HEATING ROOMS WITH RANGE	SATISFIED																	
		DISSATISFIED																	
D	UNDER READING PREVIOUS MONTH	SATISFIED																	
		DISSATISFIED																	
E	BILL INCORRECTLY DATED	SATISFIED																	
		DISSATISFIED																	
F	ERROR IN INDEXING	SATISFIED																	
		DISSATISFIED																	
G	HOUSEHOLD INCREASED	SATISFIED																	
		DISSATISFIED																	
H	ADDITIONAL APPLIANCE INSTALLED	SATISFIED																	
		DISSATISFIED																	
I	LEAKS IN HOUSE PIPES	SATISFIED																	
		DISSATISFIED																	
J	REFRIGERATOR INSTALLED	SATISFIED																	
		DISSATISFIED																	
K	SEASONAL CHANGE	SATISFIED																	
		DISSATISFIED																	
L	APPLIANCES NOT PROPERLY ADJUSTED	SATISFIED																	
		DISSATISFIED																	
M	INDEXES CHANGED	SATISFIED																	
		DISSATISFIED																	

In using such forms local conditions will naturally cause variations both in stated causes for complaints and in conclusions reached by the district investigator. Those appearing in Appendix "A" and Appendix "B" were used in studies conducted in a metropolitan area. In general this form of survey can be conducted at a negligible cost and will present a good cross-section of bill complaints and how they are being handled.

On completion of a study during which several thousand bill complaints have been tallied, it will be possible for a company to determine which class of complaint needs attention in the training of office personnel or district investigators. The completion of a survey at regular intervals will make possible a study of improvement or failure of personnel, which may be the result of training or its lack. It will further be possible to determine what matters should be stressed in future educational work. The classifications shown for customers' stated causes, and for the results of district investigation are subject to variation. Those in the forms are the result of two surveys during which a number of less significant items were dropped.

Use of Advertising or Other Means of Educating the Customer

The use of other means for explaining the consumption of gas than direct employee contact through office interview or district investigation has received thought by a number of the companies replying to the questions of the committee. Means of instructing the customer in how to read the meter and check recorded consumption is the one item that appears to be in use. A number of suggestions were made concerning various means of presenting information to the public over radio, newspaper advertising, school lectures, window displays, mail inserts, etc. While it is apparent that many feel that some special effort should be taken to impart information to customers in order to avert a bill complaint, just what that information should be is not indicated. There is one exception, that of the degree day "picture" shown in Chart No. 1, (see Feb. issue) which could be sent to house heating customers with the billing and which would help to explain consumptions.

(Continued on page 20)

A Novel Pilot

The Safety Gas Device of Bosch Is Claimed to Overcome Many of the Objections Alleged to Obtain with the Average Safety Pilot for Gas Appliances

By Dipl.-Eng. FREI

Das Gas und Wasserfach, vol. 77, p. 19, 1934.

IN gas appliances operating under comparatively high pressures, from the standpoint of safety the gas can only flow when the pilot light burns.

Such a degree of safety has been attempted in most cases where the main valve is coupled with the pilot light in such manner that it could only be opened when the pilot light was burning. A safety device of this kind has only a doubtful value, as it assumes that when the pilot light valve is opened the pilot light itself ignites every time without fail. From a practical point of view this assumption can not be made.

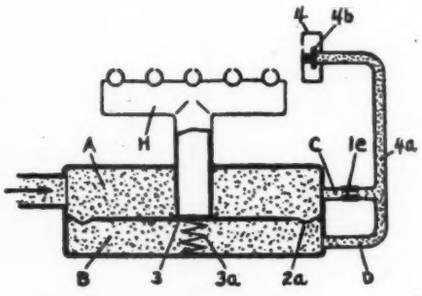


Fig. 1—Equal Pressure in A and B. Switch Closed

It was very clear that the passage of gas for the main burner should be regulated by the action of the pilot light, and the solution of this problem was accomplished by means of bi-metal springs. By the heating of these springs the closing device is brought into action. While the various operations attending a device of this kind are very reliable, on the other hand there is the disadvantage that long opening and closing intervals are brought about on account of the high heating capacity of the device.

It is desirable that an improvement be made from the standpoint of safety on account of the comparatively long closing time. A further disadvantage in previous devices is the difficulty in tightening suspended parts, which constantly gave reason for complaints.

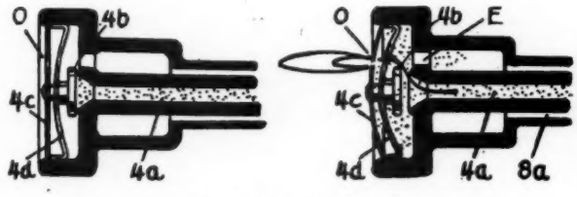
All these disadvantages have been overcome in Bosch's Safety Gas Device, a detailed description of which follows:

The principle of the Bosch Gas Device as a safety governor or switch is shown graphically in Figure 1. The gas chamber of the device, in which the gas enters from the left and flows through the middle to the Burner H, is divided by the Membrane 2a into two chambers, the upper Pressure Chamber A and the lower Pressure Chamber B. The membrane is connected with the Valve 3, which is held in place by means of the Spring 3a, the main valve being kept closed by the spring pressure when not in use. Both chambers are connected with each other through the passage C, throttle 1e, and passage D, so that the pressure is uniform.

On this circuit, connected behind the throttle 1e, is the passage 4a leading to an ignition head 4.

The ignition head, or "Expansion Lighter" is constructed like an ignition valve, see Fig. 2 and 3. The passage 4a is closed by the small valve 4b, which is held in place by the pressure of the leaf-spring 4d. The valve is opened by the "expanding membrane" 4c, which expands itself when heated, so that gas flows through the passage 4a and can be ignited as it issues through the opening 0 in the expanding membrane. A match or pocket lighter is sufficient to cause the membrane to expand for an initial lighting, thereafter by the heat developed by the pilot flame at 0.

When the pilot flame is burning,



Figs. 2 and 3—Ignition Valve Closed and Ignition Valve Opened

Fig. 4, and in consequence thereof gas is flowing through the passage 4a, the gas pressure in the upper chamber A is less than that in the lower

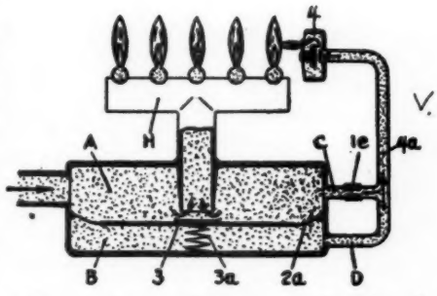


Fig. 4—Lower Pressure in Chamber B. Valves Opened

chamber B on account of the throttle at 1e. The pressure difference in both of the chambers exceeds the tension of the spring 3a so that the

valve 3 opens itself and gas flows to the main burner.

If the pilot flame is extinguished for any reason—by a gust of air or by water falling thereon—the expanding membrane cools very quickly (within 1 to 3 sec.) and the ignition valve 4b is closed by the spring 4d. When the pressures in the chambers A and B become equalized, the spring 3a closes the main valve 3.

The expansion of membrane 4c is caused by a stronger heating of its center rather than its rim. This action does not depend entirely on the different degrees of expansion of two metals (bi-metal) but also upon the fact that one plate of a uniform material is heated in the center and therefore it bulges on account of its resulting expansion.

Regulation of Amount of Gas

The quantity of gas flowing to the main burner must be regulated according to the consumption and the size of the appliance. For this purpose the upper pressure chamber is divided into the upper pressure chamber A and the valve chamber A1/A2, Figure 5, which may be considered as one.

In the dividing wall of the two chambers A/A1 is provided a diaphragm 9, through which the main

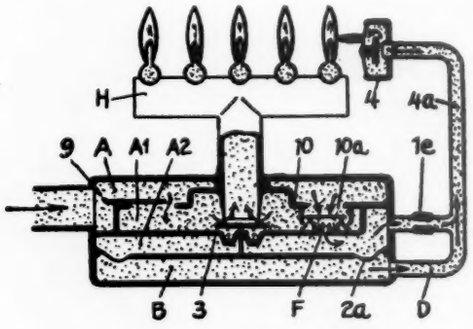


Fig. 5—Action of the Controller

quantity of gas must pass.

A constant quantity of gas would only flow through the diaphragm and the main valve to the main burner H if the initial pressure of the gas-governor could be made permanent.

Should the initial pressure Pe change, see Fig. 6, for example, on account of the igniting of the pilot flame, or by the after-pressure Pa or the burner pressure caused by the stoppage of the burner opening on account of corrosion, then only would a constant quantity of gas flow through the diaphragm 9 and at the same time through the main valve to the burner H, if the pressure difference between the upper pressure chamber A and the valve chamber A1/A2 could be held constant with the regulation pressure Pf, also Pe-Pf.

If Pe is assumed, then only can a constant diminution of pressure, Pe-Pf be accomplished by the closing of the main valve 3. The main valve 3 must therefore be so regulated that it maintains a constant lowering of pressure Pe-Pf.

For this purpose the valve chamber is separated by a solid wall into the true valve chamber A1 and the upper membrane chamber A2. These chambers are connected with each other by the small opening F. Above F is the regulating valve 10, equipped with a very light plate 10a, which acts as a valve lid and is held open by a light spring. The priming gas flows only through this regulating valve. The valve lid 10a is regulated by the pressure difference Pe-Pf between the two chambers A and A1. With an increasing pressure difference Pe-Pf the valve lid 10a is pressed down and thereby the flow of gas to chamber A2 and to the pilot light is stopped. The pressure in chamber A2 drops, allowing the spring pressure to over-balance it and in consequence the main valve 3 moves up until the right pressure difference Pe-Pf is again reached. The workings of the regulating valves can be very nicely observed during the operation of the device by the action of the pilot light.

Before this device is put into operation the same pressure rules in all chambers; a uniform pressure exists separately in the upper pressure chamber A and the valve chamber A1 on one side, and in the upper membrane chamber A2 and the lower membrane chamber B2 as well as the lower pressure chamber B2 on the other side.

The constant pressure difference Pe-Pf during the operation depends upon the position of the diaphragm 9, which regulates the flow of gas to the main burner H, while the pressure difference Pv-Ph is determined by the position of the main valve.

The highest point of the initial pressure and also of the burner pressure exerts no influence up to a certain point. Experiments made with the Bosch Safety Device show that the lowest pressure Pi min. by which the switch could be operated was 40 mm. This lower limit is given by the flow resistance of the governor, which as the smallest pressure difference Pe-Pa (Initial pressure—Burner pressure) amounted to 5 to 20 mm. as determined by experiment.

It is advisable to point out that the pressure difference of any order of magnitude which is necessary for

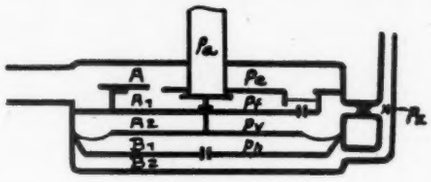


Fig. 6—The Separate Chambers of the Gas Governor with their Prevailing Pressures

apparatus of medium or larger gas capacity influences the selection of the proper burner pressure and, in consequence thereof, the size of the burner tube.

(Continued in April issue)

Improving Customer Relations

(Continued from page 18)

It appears that any form of information that would allude obviously to the possibility of increased consumption might arouse suspicion in the minds of many and would no doubt cause an increase in the number of complaints.

In conclusion, it appears, therefore, that the bill investigation can be the basis of favorable contact with the customer. The fact that a request for investigation has been made of itself indicates that the customer will take an active interest in what the company has to say. However, in order to grasp this opportunity, the employee who meets this customer must be properly trained in the difficult problems of customer relations and must be acquainted with the applicances he will be forced to discuss. If he is thus prepared, he will be able in many cases to make the bill investigation a source of good will to the company.

4,000,000 B.t.u.'s Per Cubic Foot

ALTHOUGH the upper limit was not reached, gas containing 4,000,000 B.t.u.'s per hour per cubic foot of combustion space has been successfully burned in connection with industrial gas research, as revealed in "Fundamentals of Combustion Space Requirements." This tremendous concentration of heat was attained at the A. G. A. Testing Laboratory, and while it cannot at this time be duplicated in industrial furnaces it vividly shows the possibilities inherent in gas.

ELEMENTS OF GAS TECHNOLOGY

Carburetted Water Gas

(Continued from February issue)

AFTER the set has been brought to the proper condition for gas making through the medium of the blow or blasting of air through the set, air C (see sketch, page 27, February issue) is shut off from the Carburettor and immediately thereafter air B to the Generator is shut off. Next, steam is admitted to the Generator—either through D for a so-called "down run," or U for an "up run." In either case, after the steam is turned on, the stack valve V is closed. As a general thing, steam is passed through the bed of Generator fuel both in an up as well as a down direction during the actual process of gas making. That is to say, for a portion of the time steam is passed up through the fuel bed and for another portion of time down through the fuel bed. Indeed, in some cases, this passage of steam through the fuel bed is divided into three phases; for instance, first up then down and finally up through the fuel bed.

As explained on page 23, January issue, the action of steam on the incandescent fuel bed produces water gas or, as it is generally called, "blue gas," which consists essentially of hydrogen and carbon monoxide with a relatively small amount of carbon dioxide. This blue gas passes over to the Carburettor to be met by a spray of oil. However, it would be well to trace the steps in a logical order, with reference to the status of the various valves on the set. We will assume the steam is first admitted to the Generator in an up direction through the fuel bed.

In this case steam line D is idle, so to speak, valve 1 is closed and valve 2 is open. Obviously, as observed above, the stack valve is also closed. Immediately after turning on the steam, the oil spray S is opened and the finely atomized oil meets the blue gas. This oil in meeting the hot blue gas and in its subsequent passage through the Carburettor splits up and forms an oil gas which is more or less complex in its chemical makeup; this oil gas mixes with the blue gas and the mixture passes into the Superheater where it (the oil gas) becomes permanently fixed. Were it not for this "fixing" a considerable portion of the oil gas would revert to a liquid condition of oil and tar, especially when the mixture pased through the Wash Box and condensers further along in the plant.

Regardless of the several directions that the steam might be passed through the fuel bed during the actual gas making period or the "run" as it is called, the flow of il into the Carburettor is unchanged with the exception that it is shut off about ten or fifteen seconds before the end of the run. This latter ten or fifteen second portion of the run is occupied by steam being passed up through the fuel bed. This is done to rid or purge the bottom of the Generator of blue gas. If this practice were not resorted to air passed into the Generator during the blow following a run might result in the formation of an explosive mixture. The time occupied by a run generally amounts to four minutes. Of course, during the run valve 3 is open.

At the end of the run period of say 4 minutes the bed of Generator fuel has become too cool, relatively speaking, to continue making gas and consequently it must be again heated up to the proper temperature. In other words, the process of making blue gas constitutes what is known as an "endothermic" reaction which means that heat must be supplied from some outside source from time to time to sustain the reaction. The reheating up operation is accomplished by again resorting to the blast of air. Thus, after the steam has been turned off, air blast B is admitted to the Generator and about ten seconds thereafter stack valve V is opened. This blasting of air through the Generator before the stack valve V is opened serves to drive the residue of gas through the Wash Box and thereby clear the set.

About fifteen or twenty seconds after opening the Generator blast valve the Carburettor blast valve is opened and air enters the top of the Carburettor at point C and the cycle continues as outlined.

The various valves on the set are so linked up that it is almost impossible for the gas maker to make a serious blunder which might give rise to an explosion or other difficulty. For instance, valves 1 and 2 are rigidly or intimately connected, so that when one is opened the other is closed and vice versa. Also, when these valves are changed it means that the direction of the flow of steam through the fuel bed is to be changed. Hence a special linkage constrains the steam reversing valve to function properly.

It is of interest to note that ordinary blue gas has a calorific or heating value of approximately 300 B.t.u. per cubic foot and this heating value is increased by the addition of oil in the Carburettor. Thus, by using relatively large quantities of oil, carburetted water gas as high as 1000 B.t.u. per cubic foot has been produced on a practical basis in carburetted water gas sets. Below are given some actual data showing the amounts of fuel, oil, etc., used in making carburetted water gas.

Generator air per M cu. ft. of gas made	1593 cu. ft.
Carburettor air per M cu. ft of gas made	710 cu. ft.
Steam to Generator per M cu. ft. of gas made	39.1 lbs.
Oil per M cu. ft. of gas made	3.42 gal.
B.t.u. per cu. ft. of gas made	587
Dry Generator fuel per M cu. ft. of gas made	27.2 lbs.
Temperature top of Superheater	1429 deg. Fahr.
Temperature bottom of Superheater	1432 deg. Fahr.
Length of blow	2 min.
Length of run	4 min.
Length of purge	10 sec.

A.G.A. Proceedings, 1923, pages 1030-1038

*Screened Oven Coke

The analysis of this gas is as follows

Carbon dioxide	4.7 %
Illuminants	10.8 "
Oxygen	1.1
Carbon monoxide	25.85
Hydrogen	33.25
Methane	14.5
Nitrogen	9.8

It will be noted that the gas in question has a heating value of 587 B.t.u. per cubic foot and that 27.2 lbs. of Generator fuel (coke) and 3.42 gal. of oil were used to produce a thousand cubic feet of such gas. Obviously, if we were making gas of 300 B.t.u. value no oil would be necessary and approximately 40 pounds of Generator fuel would be used—that is, for every thousand cubic feet of such gas made. From these facts one might readily deduce that, as the B.t.u. of the finished gas rises per cubic foot, the amount of oil used per thousand of gas made increases and the Generator fuel

decreases. This fact should serve to emphasize that not only does the oil increase the heating value of the blue gas, but it, due to its own inherent ability to gasify, also furnishes a certain definite volume of gas.

From time to time fuel has to be charged into the Generator and usually this is done hourly with but little time (about 5 minutes) being allowed for a charging operation in order that the set will not be held off too long from making gas. In firing it is necessary that the bed of fuel be essentially level. The cleaning of the fire is a quite important operation in the gas making routine. The number of times a fire is cleaned depends upon several conditions but for our purpose a figure of 2 cleans per 24 hours, each clean occupying approximately 2 hours, will suffice. Clearly, a clean is made in order to rid the Generator of the accumulation of clinker and ash. The ash falls readily from the bottom of the Generator when door B is opened but the clinker has to be pryed loose from the fire brick lining of the Generator by means of long heavy slicing bars.

The gas making capacity of a carburetted water gas set varies with the diameter of the Generator. Thus, a Generator with a clear inside diameter of about nine feet will produce of the order of three and a half million cubic feet of gas in twenty-four hours, with time allowed out for cleans.

It is of interest to consider the distribution of thermal energy during the gas making process. Figure 8 shows graphically this distribution. Incidentally this figure was developed from data set down by O. B. Evans in the Proceedings of the American Gas Institute for 1912, page 730. The figure is also concerned with a gas of 656 B.t.u. value made in a set with a Generator having an internal diameter of 6 ft. Further, the temperature of the blast gases as well as the finished gas leaving the set was 1280 deg. Fahr.

As shown, the heat input consists of the heating value of anthracite coal which runs about 13,000 B.t.u. per pound, the heating value of the oil which is about 138,000 B.t.u. per gallon, the heat in the steam and the small amount of sensible heat in the blast by reason of its temperature above the standard of sixty degrees Fahr.

Coming from the set we first have the finished gas which has a definite heating value per cubic foot. In addition, this finished gas is at a certain temperature which accounts for a corresponding quantity of heat. Then we know the ash and dust leave or are discharged from the set at a certain temperature and thereby contain a ponderable amount of heat. Also, the blast gases which are formed during the blowing up period leave the stack at a high temperature and carry off considerable heat. Further, the ash and dust contain some carbon which can be translated into a percentage of heat output. The blast gases contain a certain percentage of carbon monoxide which is responsible for the equivalent percentage of heat carried out by way of the stack. It is impossible to supply the theoretical amount of steam for making blue gas and, as a result, there is always an excess of steam which is not decomposed and this excess represents a portion of the heat output. Somewhat similar to steam a portion of the oil sprayed into the Carburettor during the gas making cycle condenses out as tar at a relatively high temperature; this tar is capable of being burned and therefore contains what is known as latent heat, and due to its comparatively high temperature it contains what is called sensible heat—both combined form a certain loss or portion of the heat output. All of the above output factors or items when added together and subtracted from one hundred percent leave a balance of loss or output which consists of radiation, etc.

It will be noted from figure 8 that the item in the output section termed "heating value of the gas made," which is 68.1 percent, constitutes what might be called the thermal efficiency of the set or gas making process. That is to say, of all the heat put into the set 68.1 percent is recovered in a useful form.

It must be understood that this short treatise merely touches upon the high spots of carburetted water gas manufacture, which in its entirety has many ramifications and is subject to much careful technical manipulation. The next installment will deal briefly with the manufacture of this type of gas from soft coal and some of the recent important additions to the water gas set and its operation.

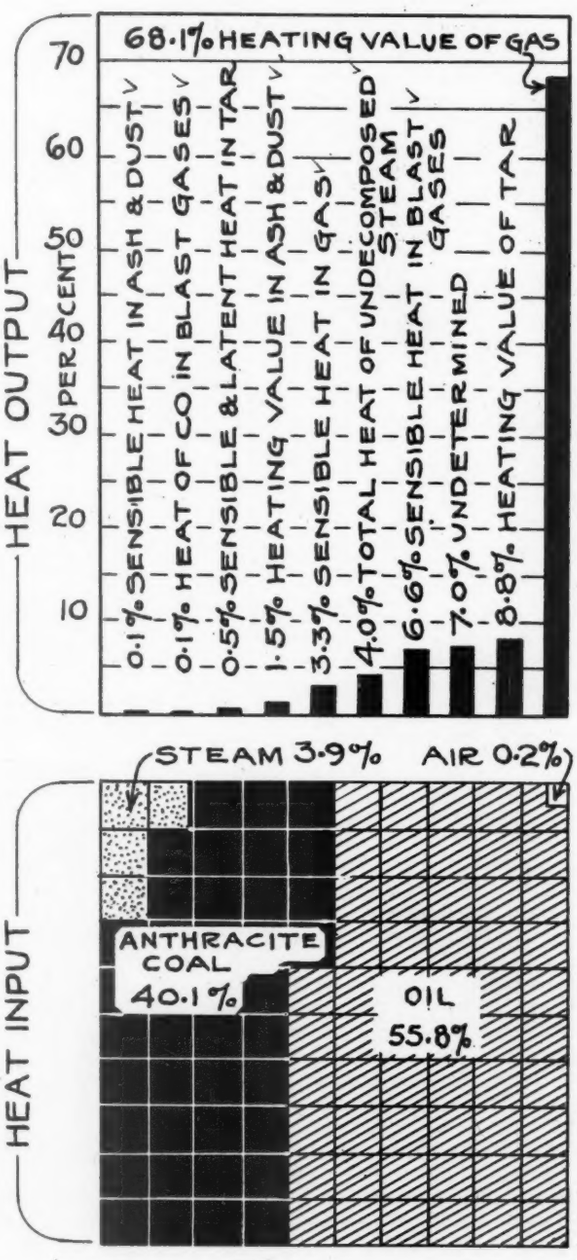


Fig. 8—Distribution of Heat in a Water Gas Set

Water Heating Sales Through Remote Controls

Milwaukee Has Achieved Success in Marketing This Adjunct to Economical Water Heater Operation. The Times Seem to Warrant Increased Activity in This Connection

By J. B. DRUSE

Milwaukee Gas Light Company

IN preparing this paper I was fortunate in being able to procure a copy of the proceedings of the 1928 Mid-West Regional Gas Sales Conference. While these proceedings contain a mass of both information and discussion, I was able to glean from these discussions the general trend of thought with respect to the proper equipment to be used in increasing gas sales through water heating appliances.

It seemed as though almost everyone at that time was sold on the idea of automatic storage type water heaters, and that circulating tank heaters with remote controls were not as desirable as a load builder. We were at the peak of our promotional efforts on remote controls for gas-fired circulating water heaters, and I must say that while we believe we "did a good job," our speaker at that time was subjected to a great deal of good-natured razzing for having cheated the Milwaukee public by selling them remote controls for their water heaters.

In the spring of 1928, when the building of small homes was beginning to gain impetus, there were many small outlets promoting the sale of automatic storage type water heaters. This condition prompted us to change our selling organization in order to meet this new competition. Three of our salesmen were selected to concentrate their efforts on the selling of automatic storage and instantaneous water heaters.

At this time also, we discontinued our special efforts on remote controls for gas-fired circulating tank heaters. It may be interesting to know that while no special effort was made to sell these remote controls, there were over 3,000 of them sold from April, 1928, up to January 1 of this year, while from 1924 to 1928 there were but 6,000 sold. There were possibly another 4,000 or 5,000 of these controls sold by plumbers and dealers located within our territory since 1924.

Automatic Heater Sales Increased

Now, as an encouragement to the proponents of automatic gas-fired storage type water heaters, I might mention that through our special efforts along this line we increased our sales of gas-fired automatic heaters by several hundred per year—the maximum year being 1930 when over 900 automatic water heaters were sold as contrasted with 285 in 1927.

In order that we might analyze our potential market for water heaters, our meter readers made a survey of the water heating equipment in Milwaukee homes early in the year of 1932. The results of this survey, in round numbers, are as follows:

Out of a total of 140,000 consumers in metropolitan Milwaukee, there were installed at that time 80,000 gas-fired circulating tank heaters and 10,000 automatic gas-fired water heaters. Fifty thousand homes were found to be without any kind of running hot water service. Of these 50,000 which were without hot water service of any kind, there were 10,000 homes where there was no suitable plumbing for the installation of a water heater.

It seems inconceivable that any great percentage of these 50,000 homes would be prospects for automatic water heaters. They must of necessity be prospects for the circulating type of water heater and possibly a remote control. In these homes, where perchance money is scarce, the weekly bath is a luxury, and it is our problem to make this weekly bath a necessity in the minds of these people.

As a result of this survey and of our appreciation of the financial conditions prevailing, we again put special effort upon the sale of circulating water heaters and remote controls. For this purpose we enlisted the aid of all of our employees and a special crew of straight commission salesmen. All of our employees attended a course of three lectures designed to acqaint them with the features and selling points of this equipment in order that they might be more effective in contacting prospective buyers.

During the five months, starting with June, 1932, during which this special effort was conducted, our salesmen and employees sold 1,101 circulating tank heaters, 112 hand-controlled storage units, 91 automatic storage type heaters, 236 clock type remote controls, and 33 pull-up type remote controls.

Previous to the time of this sale

Read before Mid-West Regional Gas Sales Conference, Chicago, Feb. 15-16, 1934.

our employees received only 50 cents for a prospect which resulted in a sale of a range or a water heater. Starting with this sale and continuing through the present time, employees have been compensated for their efforts in selling water heaters and controls as follows:

$5.00 for sale of an automatic water heater.

$3.50 for sale of a hand-controlled storage unit.

$2.50 for the sale of a remote clock type control.

$1.50 for the sale of a pull-up type control.

Straight commission salesmen during this drive were compensated on a like basis, while our regular salesmen received this compensation in addition to their regular salary.

Effect of Price Reduction

The success of this sale was due partially to a reduction in price of approximately 30% and partially to the unusual effort on the part of our employees and salespeople. The prices prevailing during this period for the following equipment, completely installed with vent pipe, were as follows:

Circulating tank heater — $18.75.

Hand-controlled storage unit, which consisted of a circulating tank heater and an extra heavy, thirty - gallon range boiler — $32.25.

A clock-type remote control installed on existing equipment —$24.80.

A pull-up type remote control installed on existing equipment— $14.00.

It seems needless to recount the history of water heating from the lowly tea-kettle through the circulating water heater, remote control, and the instantaneous and storage type water heaters. During the good old days from 1925 through 1930, there were thousands of people whose incomes were sufficient to warrant their having the benefits of automatic water heating service. During the past few years, however, these same people's incomes have been reduced to such an extent that they can no longer enjoy these advantages.

A goodly number of these people are now hand-operating their storage type heaters—a very inefficient method, since the entire tank must be heated for a small amount of water—while the remainder have their heaters shut off completely. Of this latter class there are doubtless many who have returned to the hand-controlled circulating water heater with its attendant economy but lack of convenience, while others have had tank heaters installed on their storage heaters.

Such a picture confronts us at this time. Are we going to attempt to put special effort on the sale of automatic water heaters, or are we going to spend most of our efforts in the sale of circulating type water heaters and remote controls? We are, at the present time, of the opinion that the latter is the proper course for 1934.

The fact that many new types of remote controls for circulating water heaters are now being placed upon the market is good evidence that there are more people of the same opinion. There is now on the market a remote control for circulating water heaters which can be so set that the heater will go on in one's absence at a predetermined time. This feature obviates the necessity of rising at an early hour in order that hot water might be available for one's morning bath or shave even with a lowly tank heater.

The manner in which these remote controls are sold is a rather important one. It seems that the idea of making one's own gas bill is the most important feature to be stressed.

To illustrate Milwaukee's acceptance of remote controls, I will quote from an advertisement which is typical of many appearing in the classified sections of our local newspapers.

"Lloyd St., W. 6235 — 6 Room lower, fireplace, refrigeration, Time-O-Stat, garage."

While we intend to continue selling automatic gas-fired water heaters to those who can afford its service, we believe that our promotional efforts can best be expended, for the present at least, on the sale of gas-fired circulating tank heaters and remote controls.

We feel that our decision is justified not only by the results of our 1932 market survey, but by the present financial condition of the masses.

President Roosevelt has made noble efforts and has achieved some success in making the American public "buying conscious," but the same American public continues to be "price conscious."

For all of these reasons, we are firmly convinced that the water heating load on our lines can most profitably be increased through the sale of gas-fired circulating tank heaters and remote controls.

By Attaching Remote Control to the Tank Water Heater the Load Will Be Augmented and Competition Lessened

By THOS. E. GRANT

American Gas Products Corp., Chicago

UP to the present little attention has been paid by the average gas company to promoting the sale of Upstairs Controls for tank water heaters, but I am going to ask you to give this subject serious consideration when preparing your water heating campaigns this year.

There are several types of Upstairs Controls available at the present time, namely, the manual operated, the electric and the time control. These controls consist of a valve attached to the heater with safety pilot for igniting the burner, a thermostat or limit control, placed on the tank to prevent overheating and a control or switch operated from upstairs, located either in the kitchen or the bathroom or preferably both. These controls are inexpensive, easy to install and provide a satisfactory convenience for your customers.

There are some very important factors to be considered in respect to building your water heating load, not only through the sale of automatic water heaters, but also to develop that load which already exists on your lines. I have reference to the thousands of tank water heaters that have been sold and are being sold each year, regardless of the fact that practically no attention has been paid for some years to the sale of these heaters by utility companies.

A survey in your own community, I believe, will prove without doubt that there are many tank heaters which are in use on your customers' premises, where Upstairs Controls could be sold if they were brought to their attention. It seems to me that any reasonable expense incurred to obtain this information would be well worth while to your company.

Gas Use Increased

Figures have been obtained from gas companies, who have sold Upstairs Controls over a long period of time and they all agree, that with the use of these controls, there is a substantial increase in the use of gas for water heating. One company here in the middle west made an actual check on 500 installations, comparing the bills for one year, where these remote controls had been installed, against a full year prior where no controls had been used and the average increase was 1,100 feet per month. If we estimate that the pilot is 300 feet of this consumption it leaves 800 feet additional use of the heater because of the convenience of the control. It is difficult for me to realize that there are very many people who have tank heaters who would object to this kind of cost if they could purchase the device on easy enough terms.

For many years the tank heater was the back-bone of the gas water heating load, but during the so called golden years gas companies paid little attention to their sale. In fact many gas companies did not display this type of heater on their sales floor at all, and it required a major operation for the customer to purchase one, as all efforts were made to sell only automatic water heaters. I would not for a minute suggest that you lessen your efforts in the sale of automatic water heaters, but instead combine your activities in order to increase your water heating load through the use of these tank heater controls. Practically all tank heaters are installed in the basement and the inconvenience of going down stairs to light the heater and another trip to shut it off eliminates its use many times during the month. However, with a conveniently located control upstairs the use of hot water in the home will be materially increased, as present day living demands convenience and comfort, and you will render a service that will return you dividends, and keep your customer pleased with your product, which will tend to eliminate the possibility of competitive fuels being used.

We will all agree that the automatic water heater is the ultimate for hot water service, yet we must recognize the fact that it is absolutely impossible to sell all your customers this type of appliance. Experts have looked into the family income and have placed us all in groups according to yearly earnings. They have found out the following things about us as families. First, that one-third of the families in this country have incomes less than $1,200 per year. Second, that the next one-third have incomes between $1,200 and $2,000 a year and third, that the highest paid one-third have incomes over $2,000 a year.

While there will always be prospects for automatic water heaters, we realize that in every community there are a number of persons whose income will not permit them to buy this type of appliance. However, they could pay a small amount for the convenience of an Upstairs Control.

In order to popularize these controls I suggest they be sold on a basis of small monthly payments extended over a long period of time. A great majority of your prospects will be able to purchase the device on this basis and will gladly pay for the convenience.

We see beautiful ads in the papers today whereby "You Can Fire Your Furnace From Your Easy Chair"; obtaining hot water should be made just as convenient, and at a cost in keeping with the income of your customer.

Determined Effort Needed

During this year a determined effort will not only be required to add to the water heating load but to retain what you already have. Competitive fuels will enter into this field more actively than in the past. I am thinking of the manufacturers of oil burning water heaters, who make extravagant claims for the service that can be rendered at a very small cost. Heaters of this type are now being sold throughout the country by two of our largest mail order houses, as well as through the dealers, and you must recognize this threat to your business and be in a position to combat it. Also a very decided increase has been shown in the sale of the so called bucket a day coal heater. This is a type of water heater that had been practically eliminated for a number of years.

In my many years of experience in the gas business I have never known a time when there were so many elaborate and extensive water heating campaigns as are now being planned, and I fully believe that it will be one of the biggest years in water heating sales. Liberal terms extended over a long period, with special water heating rates in some companies will undoubtedly make gas water heating more popular than ever before, and I am of the opinion that if you will include Upstairs Controls in your water heating set-up, satisfactory results will follow.

In building the house heating load, conversion burners played a very important part in educating the public to the use of automatic gas heat, and eventually gas designed equipment will replace them. The sale of Upstairs Controls will be a stepping stone, in many instances to 100% service, which can ony be obtained through the use of the automatic water heater.

Opportunity for Sales

There exists tremendous opportunity for the sale of Upstairs Controls, due to the fact that there have been comparatively few of them installed. Generally speaking, people are not familiar with the fact that a device of this kind is available, and the proper publicity in connection with your other water heating advertisements will built up the interest which I am sure would bring favorable results.

It will probably be necessary on account of the comparatively low price of these controls to make their sale of sufficient interest to your salesmen so that they will not fail to keep it in mind.

Direct by mail pieces to tank heater users will undoubtedly help, and an attractive floor display prominently located should be made. This control is compact, and a demonstrating outfit can be easily carried, so that it can be shown in the home, and the simplicity of its operation will appeal to your customer. In addition to this some organized activity with the employees, other than your sales organization should be brought about, interest can be built up in this manner through paying them a commission, based on sales or prospects that result in sales.

In the final analysis your only objective is to build the load, regardless of the medium through which it is done, and if you can make those little BTUs chase each other faster through the meter and cause more of these synthetic dollars to jingle in the cash drawer, your work will have been well done.

The Problems of the Small Gas Company

From Actual Experience the Author Points Out Definite Ways whereby the Small Company Can Cut Expenses and Increase Profits. His Suggestions Are in Many Cases Applicable to Manufactured and Natural Gas Companies Alike

By JOHN A. WEISER

Vice-President, Newport Gas Light Company

Cleanliness and Neatness in the Small Gas Plant generally Accompany Thrifty Operation

I HAVE had a few small units under my supervision at one time or another and I think that out of that experience some conclusions can be drawn that will aid some managers who are struggling today to make a company that may have anywhere from 500 meters to 5,000 meters earn a fair return for its stockholders.

My first observation pertaining to this problem is the human element. The personnel of the small company from the manager down to the last employee must be imbued with the idea of saving money. Thriftiness coupled with giving good service in the small company, be it one of 500 meters or 5,000 meters, is one of the traits that is absolutely essential, bearing in mind that good service *must* be given to its customers. Most companies of this size have great difficulty in increasing revenues. Therefore, expenses must be held to the minimum.

The manager of such a company must be a man capable of performing every duty necessary around the plant, distribution department, sales department or office. He must be master of all phases of the gas business of his company. Where the large utility can afford to pay for the services of a well known consultant along a given line, the small utility cannot afford such outlay. Therefore, the manager must use his judgment in solving a particular problem. I know of a few companies of 400 customers to 1,000 customers in size which, when they purchase a pipe wrench put the company in the "red" for the month.

I know it is very difficult for a small company to progress with extravagant management. One such company that came under my observation several years ago made great strides in improving its net mostly by a change of management. The point of view of the first management was to "spend money in order to make money" and that of the succeeding management to "save money to make money." The latter method produced a greater net under practically the same operating conditions as the former.

The question of rates is of paramount importance to the type of company we are discussing and closely

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related to rates is the cost-of-production problem. Then next in importance is sales—sales of appliances that will produce substantial revenues.

Fixed charges are ever important in our total costs. In a community capable of giving a gas utility 1,000 meters, a butane plant with its low first cost and consequently low fixed charges would probably be considered, were a new plant to be built. The varying cost of butane and its transportation cost contribute in a major way to a decision for or against the advisability of installing such a plant.

However, I believe our discussion can be confined to water gas plant operation because Brown's Directory of gas companies for 1933 indicates that in New England there are 59 gas companies having less than 5,000 customers, divided as follows as to production facilities:

31 carburetted water gas plants
20 which purchase gas from another utility
5 coal gas plants
3 butane plants

The company that purchases gas usually has its production cost fixed in a contract with the selling utility. Therefore, there is not much chance for it to reduce its production cost. But the small carburetted water gas plant, if its production cost is high, can very frequently have its costs reduced by careful planning and watchfulness on the part of all employees. I am familiar with several water gas plants located in another part of the country ranging in size from 400 customers to 900 customers whose production costs per M made were reduced by careful management over a period of two years as follows:

Production Costs/M for Year Ending April 30, 1929

Plant No.	*Supt. & Lab.*	*Boil. Fuel*	*Gen. Fuel*	*Gas, Oil*	*Misc. Exp.*	*Maint.*	*Tar Cr.*	*Total Prod. Cost*	*Gas Produced*	*No. of Customers*
1	15.8	6.8	13.4	20.4	4.7	7.6	*0*	68.7	20807M	386
2	17.1	7.9	13.0	26.7	2.6	8.0	*1.2*	74.1	23044M	672
3	16.6	8.5	12.1	21.6	4.4	1.7	*.2*	64.7	34834M	905
4	14.0	5.2	12.4	20.9	3.0	3.2	*.3*	58.4	27846M	677
5	20.4	5.7	13.1	20.3	3.6	4.8	*.6*	67.3	22919M	663
6	19.6	6.4	13.5	20.8	3.3	4.3	*1.0*	66.9	22931M	708

Production Costs/M for Year Ending April 30, 1931

Plant No.	*Supt. & Lab.*	*Boil. Fuel*	*Gen. Fuel*	*Gas, Oil*	*Misc. Exp.*	*Maint.*	*Tar Cr.*	*Total Prod. Cost*	*Gas Produced*	*No. of Customers*
1	13.9	5.0	11.6	18.3	4.9	2.7	*1.7*	54.7	22033M	427
2	13.9	6.4	12.6	18.1	4.2	3.6	*1.6*	57.2	24555M	636
3	12.2	6.5	9.1	18.4	3.3	3.2	*.4*	52.3	35775M	836
4	11.2	3.9	10.3	18.4	1.8	1.4	*1.6*	45.4	32800M	712
5	15.1	5.1	10.7	17.6	5.5	2.7	*2.3*	54.4	21305M	613
6	13.7	5.2	13.1	17.5	3.0	2.5	*2.0*	53.0	26633M	728

The reduction in costs shown above was due to the following reasons:

(*a*) Unconsumed fuel was picked from the clinkers after removal from the generator.

(*b*) Tar was carefully stored and its value as a boiler fuel determined and compared with its value as a saleable product, and then disposed of to the best advantage of the company.

(*c*) Generator fuel and oil were purchased under the most favorable terms possible. Frequently costs can be kept down by purchasing these materials in conjunction with one or two nearby companies, thereby reducing unit costs.

(*d*) Experimenting with the cycle to get the gas machine in balance and then adopting the cycle that will produce the most economical results. By doing this, average generator fuel/M made for all the above plants was reduced from 35.8 lbs. to 32.7 lbs. By properly balancing the cycle and by always watching the seal at the outlet of the wash box for oil that was not cracked, it was possible to reduce the oil used/M from 3.1 gallons to 2.8 gallons, maintaining the same B.t.u./cu. ft.

Saving in a Small Item

Economies were also made by purchasing a cheaper grade of waste and wiping cloth for plant use; "U" gauges and small accessory equipment of this type were made by the manager or one of his employees; the firemen were instructed carefully how to fire the boilers so that less fuel would be used but at the same time keep the required steam pressure on the system. Boiler water treatment was not of the proper make-up to keep the boilers clean. A nationally known manufacturer of this material was called in and made a compound suitable for the water conditions existing in each locality, thereby reducing the cost of this commodity. A gas maker and a fireman were the only two men working at each plant and their hours on duty were made to conform to the load in each town, so that plant machinery could be kept in repair by them and the holder filled up during the most advantageous part of the day.

Rate Question Important

The question of rates is a very important one to any gas company, but to the small company—hard pressed for earnings and with high operating expenses—it is of paramount importance. Suppose you were manager of a small gas company with a base rate of anywhere from $1.50/Mcf to $2.00/Mcf and the electric utility determined to take your domestic cooking load from you with an electric rate that averaged 3c per KWH for all electricity used, if an electric range were installed. What would you do to retain your domestic load which included cooking and water heating? I believe nearly every gas man in this audience would fight with his back to the wall and put into effect a rate designed to hold his business and bring in a return, even if a lower return than he had had in previous years.

We experienced a situation similar to this in another section of the country and attempted to meet the issue squarely. First of all, the adoption of a class rate was an effective move that aided materially. A domestic water heater rate was filed first. This rate was as follows: First 2M—$2.30/Mcf, excess $1.10 per Mcf net, minimum charge $4.60; which compares with the following base rate: First 5 Mcf $2.30/Mcf, next 5 Mcf $1.75/Mcf, excess $1.30/Mcf net. This class rate enabled us to secure 20% of our domestic customers as automatic storage water heater users. Then the fight started in earnest.

The electric utility centered its drive on our gas cooking load. The water heating class rate aided us in holding some of our domestic customers but something additional had to be done. The electric company used the slogan of "one meter for your home"; sent in a home service demonstrator; used additional salesmen; used plenty of newspaper advertising and did many unethical things to get our load. We countered with better service; plenty of appropriate advertising; several types of hand bills distributed to every home and additional salesmen who were granted extra compensation for range and storage water heater sales. A new rate was then introduced

which was a one-meter househeating rate but which was designed to hold our domestic cooking load.

Before explaining the rate, I should state that the electric utility was not taking away our two and three dollar per month customers but taking from us our ten to twelve dollar per month customers—the class of customers who could afford to qualify for the one meter househeating rate. This househeating rate was 75c per Mcf net for all gas used in the customer's residence, providing the customer would heat his residence with gas either by a central plant, space or fireplace heaters. This meant 75c gas for cooking and heating by a company that could not afford it, but, in order to hold its business, it was compelled to put into effect such a rate. In addition to this, the new business expenses of this company increased from about $4,000 per annum to over $8,000 per annum, while the fight was on.

Customer Calls Required

It was necessary for the manager and salesmen of this company to get an intimate picture of this situation; to do so made it necessary to call on many customers to get their viewpoint on electric cooking versus gas cooking. As soon as a report was brought in that a certain customer was contemplating discontinuing the use of gas for cooking and water heating, the manager called on the lady of the house and had a talk with her so that her reasons for considering changing from gas to electric cooking could be listed and analyzed. These conversations brought many items to the attention of the management. High operating cost was the principal objection to the use of gas. This necessitated knowing what appliances were in use in the customer's home and a record of the gas appliances in use in the various residences was compiled.

After considering all the facts and data gathered from several hundred conversations, the management decided on the use of the one meter rate mentioned previously. At the same time, the sale of low input water heaters, the most modern gas range of the time and fireplace heaters and building heaters was developed on a broad front, supported by low monthly payments on appliance sales, free servicing of appliances at stated intervals without call from or cost to the customer, and trade allowances for old equipment.

Class rates can be of great benefit to the small company in answering its rate problem, if they are set up after a thorough study of the individual requirements in each locality. A rate survey and the intimate knowledge of a given class of customer needs will indicate the type of rate to be made available.

The sales problem in the small gas company is a difficult one. In practically every instance, the manager of a small company is handicapped by high rates. Class rates will aid in solving this problem, but they will aid only as they are skillfully applied. The larger of the small companies can afford a complete sales department. I refer to the company having 5,000 or more customers.

The company having less than 5,000 customers should have a sales organization commensurate with its earnings and competitive conditions. In this case, the manager, service man, girl behind the counter and other employees must be the sales department. Such an organization can do a selling job, if trained properly and compensated for selling in addition to their regular compensation.

The employees of the gas company in the small town are known to nearly every inhabitant in that town and the manager of such a company should be sure that he has in his employ men or women who are respected and favorably known in that community. When an employee of the gas company who is well known and liked recommends a certain appliance to his friend, that friend knows instinctively that the appliance must be right. This lessens sales resistance and is an aid to selling that I know the executives of large companies wish they had.

Knowing the Customer's Problem

My immediate superior has often told me that the managers of utility companies do not know what is transpiring in the customer's home in connection with our utility service. Therefore, the utility can not grasp the customer's problem rapidly enough to be on the scene early enough to compete successfully with competitive fuels. The small company should capitalize on its ability to live close to its customers, because it has a valuable asset in this close relationship.

The problem of merchandise turnover and invested capital in the Sales Department of the class of company under discussion is an acute one. The way to control this use of capital is to insist on the merchandise inventory being within a predetermined sum of one dollar per meter or a figure in this neighborhood for companies of from 2,500 to 5,000 meters. Smaller companies, to do any merchandise volume, however small, would need a larger allowance than this. The question of credit extension and the amount of capital tied up in merchandise accounts receivable is a matter of local policy.

In my own company, we feel that, if we can hold our merchandise inventory to somewhere near one dollar per meter, we can carry the proper stock of saleable units and turn our inventory about four times per year. This turnover will not produce a net profit in the merchandise and jobbing department but will hold the net loss to what we consider a satisfactory figure, when local competitive conditions are taken into consideration. We charge every item of expense properly belonging to our Sales Department to the expenses of this department so that a true picture of the cost of operating it is available.

Matter of Mark-up

The percentage of mark-up used in establishing the selling price of appliances must be given careful consideration by our small company managers because of three factors:

(*a*) Competition from merchants within the same city; (*b*) Competition with oil, electricity and other fuels; (*c*) Nearness of larger cities wherein the gas companies have a more varied stock of merchandise to choose from.

Here again, the ingenuity of company management and policy will be needed to properly price a given appliance so that your small gas company can sell what a customer needs and secure the price for it consistent with prices in its immediate vicinity.

How much company capital is to be tied up in merchandise accounts receivable is a question each manager has to answer. Local business conditions as well as competitive conditions enter into making an accurate answer. Suffice it to say that collections should be made as diligently as possible so that as little as possible of company funds will be tied up in this phase of the business.

A major decision to be made by our small company manager is that of the appliances to be sold by his company. He should carefully consider the kind, type and size of gas appliances that will have greatest public acceptance. The selling price of each appliance also has a vital bearing on this question. Not too many varieties of any one appliance

should be displayed. I believe 3 different makes of gas ranges and 2 different makes of water heaters are all that are necessary on the small company sales floor. However, this decision should be made only after a careful study has been made of the sales possibilities in each community. This decision is one of great importance because it will involve expense and responsibility for the gas company. The small company manager can make this decision only after a detailed personal investigation of all the factors bearing on the question.

A Decision Must Be Made

Decreasing revenues in the small company make it difficult to maintain a sales department under present conditions; yet competitive conditions require a sales effort commensurate with the small company's earnings. There arrives a time when the manager of the small company must make a decision as to how far he can go in maintaining a sales department with decreasing gas revenues and this decision will have to be made in the light of local conditions.

Domestic oil range burner competition cannot be met successfully in some of the small companies, in my opinion, because the class of people using range oil burners were the gas company customers who, when they did use gas, had gas bills of $2.50 a month or less. At least, this is true of the customers in our city who have gone to oil for domestic cooking. It seems that little or no effort should be put forth to hold them because they are forced by economic reasons to use oil as a fuel. When the economic picture changes, those lost customers will return to gas, which most of them are willing to admit is the better of the two fuels.

Oil for commercial cooking is a really tough competitor. A low rate is the one essential to combat it—I do not mean a rate low enough to be able to compete with oil on a dollars and cents basis but a rate low enough so that, when all the advantages of gas are taken into consideration, it will be on a level with oil for favorable consideration. The small companies, in New England in particular, face a serious problem in this respect because, in most instances, they are situated immediately adjacent to a larger company. The larger gas company can afford to and does put into effect low rates to hold its commercial cooking load. The small gas company next door either has to do the same thing or lose its commercial cooking load to oil.

Realizing the seriousness of this situation, I discussed it on several occasions with the executives of several large gas companies and their respective comments were that there was only one solution to the question: viz., that the small companies would have to reduce their commercial rates to hold the business or lose it. This is easier said than accomplished.

A constant problem in the small company is that of keeping the domestic load and increasing it. I believe this can be accomplished by the sale of automatic storage water heaters and gas refrigerators. This is being done in our situation by a constant drive on low input water heaters and gas refrigerators supported by a special rate.

In the distribution department, the small company management faces additional problems requiring the ingenuity of the manager to solve them successfully from a financial or cost point of view. Main and service leaks require prompt attention, regardless of the cost of repairing them. Free work on customers' premises should be given to aid in developing the gas load. If the small company management feels it cannot afford to give free service, the charge for service should be worked out carefully from company cost and the cost of repairing them with the company personnel should be determined and compared with the cost of repairs charged by the manufacturer and, of course, the lower cost method used.

Repair of Meters

Some small companies have found it advantageous to have in their employ a meter repairman who would make meter repairs and, when not engaged in this work, he would be performing other duties. One company I am familiar with has a man capable of doing a certain skilled piece of work for which he is paid the current rate of wage while doing that particular kind of work. When on other work less skilled, he is paid the prevailing rate for such work.

Several men in the service department should be well trained in caring for and keeping clean and in the best adjustment all automatic water heaters, refrigerators and building heating plants on their lines. Gas ranges are usually carefully serviced by all companies on call. It is the water heater, refrigerator and building heating plant that should be serviced at stated intervals by the small company without waiting for a call from the customer because it is vitally important to keep these three appliances working at their greatest efficiency to keep out our competitors. In my own company, we voluntarily service automatic water heaters and refrigerators every sixty days and building heating plants once yearly without call from or cost to the customer.

We also service restaurant appliances every sixty days. This item of free service is very important and managers of small companies should not overlook its value to them in combating oil competition. This is not as great a task as you probably think it is because, when the service man visits these appliances that frequently, there is not a large accumulation of dirt or difficulties to overcome. I can assure you this pays handsomely in customer good will and favorable word-of-mouth advertising. In our company, which has about five hundred such appliances to service, one man traveling by automobile does the job.

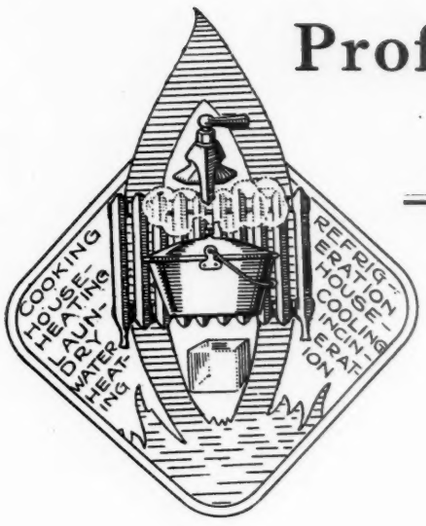
Use of Prepaid Meters

The small company should give very careful consideration to the use of prepaid meters when used for collection purposes. I do not think such a company should arbitrarily decide to put a prepaid meter in a customer's residence just for the sake of holding that customer or for the purpose of collecting a bill in arrears. The size of the customer's usual monthly gas bill, the added investment of $4.00 or $5.00 in the meter, the added cost of repairs and maintenance of the meter and collecting should all be considered when contemplating the use of a prepaid meter. We are using prepay meters for collecting purposes only and, every time a prepay meter is to be installed for a customer, the matter is brought to my attention and each individual case analyzed to be sure we do not tie up additional capital to collect a bill from a customer whose use of gas does not justify the use of the capital.

It has been my experience in taking over small gas companies through purchase from local owners that such a company has absolutely no records upon which to base judgment in making decisions and policies. Books of a kind are kept, it is true, but not enough detail to make proper analyses. Practically no operating records are available and only

(Continued on page 38)

Profitable Pointers



IT seems the "Cash and Carry" plan of selling circulating gas water heaters is to be a popular one this spring. A gas man we talked with a few days ago said, "We've got to set up a sale on tank heaters that will permit us to regain some of the

business that seems to have drifted into other channels for the reason that, while we have always sold heaters as units, we have always advertised and priced them as water heating jobs, at so-much-connected. This year we are also going to feature the fact that folks may buy the heater separately and have any one they see fit make the connections." This plan may have its draw-backs from the gas man's point of view, but it might be worth studying over.

DESPITE the fact that a number of old timers in the gas business have said to us during the past year "There's nothing to these big public demonstrations," we raise our voice and answer "If you can have or if you can tie-in to a big city-wide cooking school or demonstration, go to it." If these demonstrations do nothing more than acquaint the women of your community with the fact that there are new gas ranges on the market that experts in the culinary art prefer and can work wonders with, it is worth all that such a show usually costs. We rise up on our hind legs and say, "we have known a number of home service workers who by their hard, consistent plugging have done wonderful work for gas cookery and who will be a mighty help this spring in getting new business and holding the replacement business, if given an opportunity and the proper support. Let them carry on bigger and better than ever. We need cooking demonstrations and schools for the new crop of cooks coming on, year in and year out."

WHEREVER you go these days you will find merchandise men talking about "Charlie Consumer." It seems that Charlie is being consulted on all sides. Retailers and manufacturers are not saying "Here it is; this is what you should have, or this is what you want." They are going about openly inquiring "What

is it you want; what do you need; what will you buy, Mrs. and Mr. Consumer?" Gas range manufacturers and gas water heater manufacturers are asking such questions or they were until they developed their 1934 models, which as any gas man can see are built to fit a need that "Charlie and Mrs. Charlie" indicated existed in their home. That old "what it will do for you" is the thing that is getting names on order blanks today. Think this over when you plan your range, water heater or gas refrigerator activity, get that appeal into your sales talk, your advertising and your window displays and you'll find purses being opened and people producing the wherewith-all to purchase wares they have been made to feel they need to make life a bit sweeter and more comfortable.

THE gas man who would capture the home manager's eye will do well to feature "ease" and value in his advertising. This applies to all types of advertising—direct mail, newspaper and window display. Value, as we all know, coupled with the fact that she could depend upon the gas man for service if she needed it, has led many women past the dealer's store to shop at the gas company. The fact that the "stoves the gas company sell are good and they give you good serv-

ice too" has been pretty firmly fixed in the mind of the housewives who bought gas ranges during the recent past, and this fact will again bring them to our stores. The customer we have in mind, when we make the above suggestion, is of the new crop who, having carefully to count their expenditures, are going to seek convenience and value when they set up for themselves.

HOW do you follow up your customers' magazine—if you publish one? Some companies seem to be content to send such a publication to their customers month in and month out and let it go at that. House publications should have some sort of follow-up or tie-in. One instance of an excellent tie-in, that came to our attention recently, is that of the West Penn Power Company, Pittsburgh. This company makes an enclosure of a return postage paid card with each magazine. This post card is conveniently printed with a number of "re-

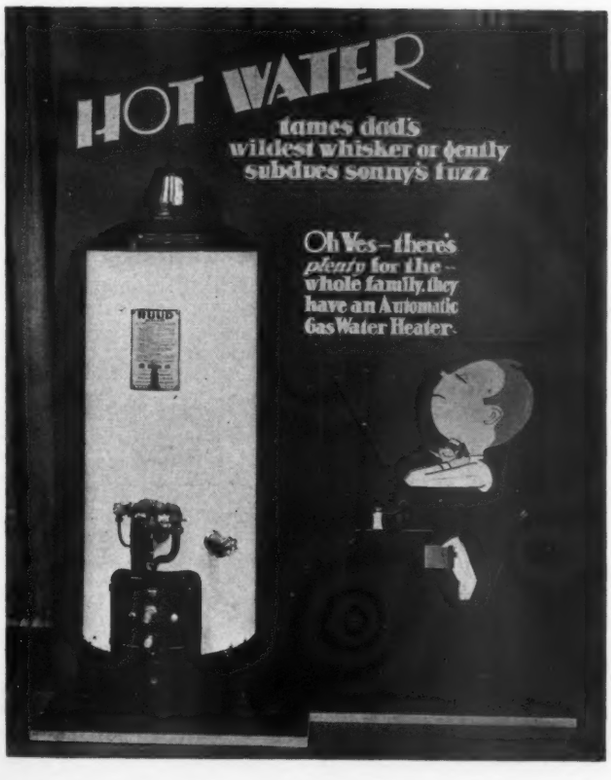
quests" for further information or printed booklets pertaining to items advertised in each issue. If you mail a magazine to your customers try this, or at least employ the coupon idea. In other words, if you spend a portion of your advertising appropriation for such material, try to ascertain just how carefully the customer reads it and just what it is producing for you.

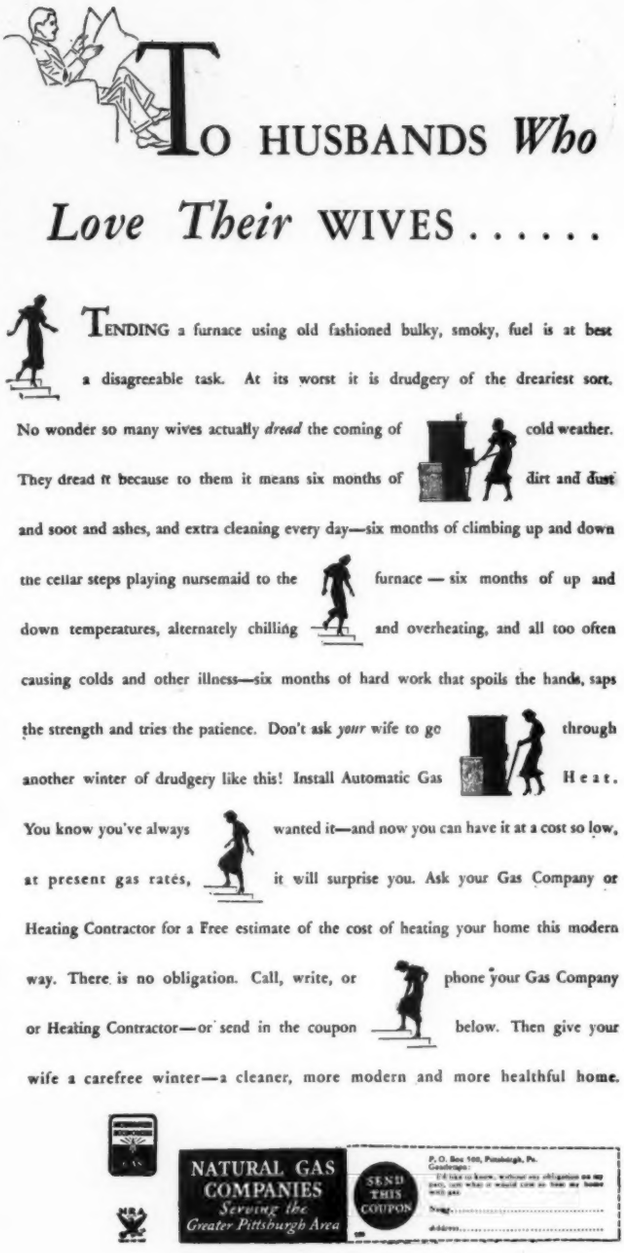
HERE'S an idea that came to our attention a short time ago that may fit into your scheme to sell circulating or "tank" water heaters. The plan is called the "Round-Up of Antiquated Water Heaters." The antiquated heater is designated as the tea kettle and the plan is to pay one dollar for all old tea kettles turned into the gas company when acompanied by an order for a circulating gas water heater. The heaters are offered on two plans: The cash and carry plan, wherein is set a price for those who wish to purchase the heater only, and a plan where the customer wishes to pay a small amount down when he places his order and the balance with his gas bill over a period of from six to twelve months. Given sufficient publicity, it seems that this plan should produce a great many sales during the next month or two when furnaces are let down and every one in the home has to solve the daily hot water problem in some manner or other.

WHEN furnace fires are down in the spring, father —to name one member of the "Consumer" family —begins to fuss and fume because of a lack of hot water; "tepid water never tamed a fella's whiskers," he's heard to say. At this season it is the time to talk to him about automatic hot water service. One of the best ways to get this message over is to make a timely display at the point of sale. One man who does this in a good way is R. M. Angel, Display Manager of the New York Power and Light Corporation, who builds his window display advertisement to say "here it is; here's where you get it."

NOW is the time to think of promoting the home heating business for next year. Overhaul your mailing lists; write letters to the builders of new houses and to folks who are moving into new homes; talk to contractors, heating engineers and architects and mail them them catalogs. Start your newspaper advertising early and use all the space you can afford. 1933 campaigns that rang the bell were staged by The Laclede Gas Light Company, St. Louis, The People's Gas Light and Coke Company, Chicago, The St. Louis County Gas Company, and the Natural Gas Companies of Greater Pittsburgh; and they were all users of liberal lineage and other forms of advertising material.

"BEWARE of the ides of March" and don't let them deter you for a moment in perfecting your plan to get into action to sell MODERN GAS COOKERY starting on Monday morning, April second. If you lay your plans carefully and follow them through consistently, you will hit a new high on GAS range sales this year. Plan your advertising carefully, plan your window and store displays to tie-in with your publicity, demonstrate every day if possible but in any event, do so at least twice each week and advertise this fact.


HOT WATER
tames dad's wildest whisker or gently subdues sonny's fuzz
Oh Yes – there's plenty for the whole family, they have an Automatic Gas Water Heater.


TO HUSBANDS Who Love Their WIVES . . . . . .
TENDING a furnace using old fashioned bulky, smoky, fuel is at best a disagreeable task. At its worst it is drudgery of the dreariest sort. No wonder so many wives actually dread the coming of cold weather. They dread it because to them it means six months of dirt and dust and soot and ashes, and extra cleaning every day—six months of climbing up and down the cellar steps playing nursemaid to the furnace — six months of up and down temperatures, alternately chilling and overheating, and all too often causing colds and other illness—six months of hard work that spoils the hands, saps the strength and tries the patience. Don't ask your wife to go through another winter of drudgery like this! Install Automatic Gas Heat. You know you've always wanted it—and now you can have it at a cost so low, at present gas rates, it will surprise you. Ask your Gas Company or Heating Contractor for a Free estimate of the cost of heating your home this modern way. There is no obligation. Call, write, or phone your Gas Company or Heating Contractor—or send in the coupon below. Then give your wife a carefree winter—a cleaner, more modern and more healthful home.
NATURAL GAS COMPANIES
Serving the Greater Pittsburgh Area
SEND THIS COUPON

Technical Digest

GAS vs. ELECTRICITY FOR COOKING

The advantages in using gas for cooking purposes in comparison with the use of electricity for this purpose are brought out in a discussion of the results obtained from a series of tests carried on under the direction of Mrs. D. D. Cottington Taylor by the Good Housekeeping Institute.

Tests were conducted on three pairs of gas and electric cookers, preparing similar menus over a period of seven days.

There was little to choose between the two cookers as far as the operation of taps and switches is concerned, although there was about a 7% advantage in favor of gas, due to the ease of adjustment of gas taps in controlling the heat.

In the saving of time it was found that breakfast could be prepared about 30% faster with gas than with electricity, and water boiling was on the average 63% more rapid on the gas cooker. The report indicates that the quality of cooking was practically identical with gas and electric cookers.

In the matter of cost gas was shown to have a big advantage at prevailing prices of gas and electricity. Evidence is presented to show that 23 or 24 units of electricity are necessary to do the work of one therm of gas when used for cooking.

Tests were made to determine the relative efficiency of different size cookers and also as to the efficiency of ovens and hot-plates.

The following table gives some information as to the relative efficiency of ovens and hot plates, and will show that the hot-plate on a 7-person cooker was not particularly efficient, although it had an efficient oven.

	oven		hot-plate	
Size of Cooker	Units per Therm	Gas efficiency Elec. 100	Units per Therm	Gas efficiency Elec.=100
3	13	44	18	61
5	15	61	24	82
7	18	61	14	48
Mean	15.3	55	18.7	63.7

In addition, it is pointed out that with an electric oven the heat is not immediately available, and requires more judgment in its operation. The three position electrical switch is not as flexible as a gas tap, simmering is difficult on an electric cooker and the thermostat simplifies oven cooking with gas.—*The Gas World, Vol. 100. No. 2582, Pages 80-81 (1934).*

THE THYLOX GAS PURIFICATION PROCESS

The Thylox gas-purification process is a recently developed method for removing hydrogen sulfide from gases by scrubbing them with a liquid, called in the gas and coke industry, a "liquid purification process."

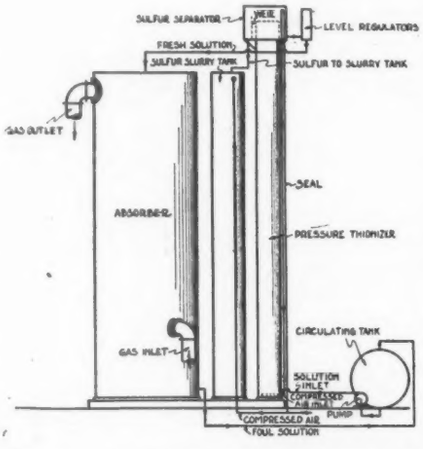


Figure 1.—Thylox Liquid-Purification Plant with New Type Thionizer.

In this process the sulfur is recovered in a finely precipitated form, which has been demonstrated of value to agriculture, and to the soap and chemical industries.

Although this process was only placed in commercial use a few years ago, it is now in operation in ten plants in the United States, Canada and Germany.

An aqueous solution is used that has the property of absorbing hydrogen sulfide in the gas and can be regenerated by absorption of oxygen. Figure 1 shows a flow diagram for a typical installation. The large absorber at the left is the gas-scrubbing tower in which the solution removes the hydrogen sulfide from the gas. The pressure thionizer is for the regeneration of the solution. Compressed air is blown into the bottom as shown, oxygen is absorbed by the solution with precipitation of sulfur which collects at the top as a froth. As the sulfur-froth accumulates it over-flows into the sulfur slurry tank. After filtering and washing, or melting, the sulfur is ready for sale. This process operates continuously, the regenerated solution enters the absorber from the pressure thionizer, scrubbing hydrogen sulfide from the gas. The fouled solution returns to the thionizer where it is regenerated and the sulfur separated as it is formed.

Figure 2 shows one view of a thylox liquid purification plant designed to purify 12,000,000 cubic feet of gas per day. The absorber is the large tower in the center, and adjacent to it on the left is one of the sulfur-slurry tanks. Figure 3 is another view of the same plant. The three small towers on the left surmounted by the housing are the pressure thionizers. The two shorter towers are the sulfur-slurry tanks and out of view behind them is the absorber.

The compactness of this plant and the small space required are evident. The total area occupied by this equipment is 675 square feet. In the oxide purification process it would require 9,000 square feet of space to purify 12,000,000 cubic feet of gas per day.

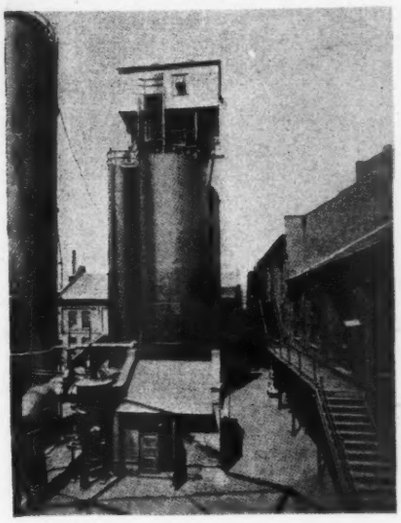
Sodium or ammonium thioarsenate is the active ingredient used in the thylox process. Since this is an arsenic bearing material, the question has arisen as to the toxic nature of the process. A thorough study of the subject was made by E. R. Hayhurst, professor of hygiene at Ohio State University, who found that there was no evidence of arsenic poisoning in any of several men who had been working in a Thylox purification plant for eight hours a day for ten months.

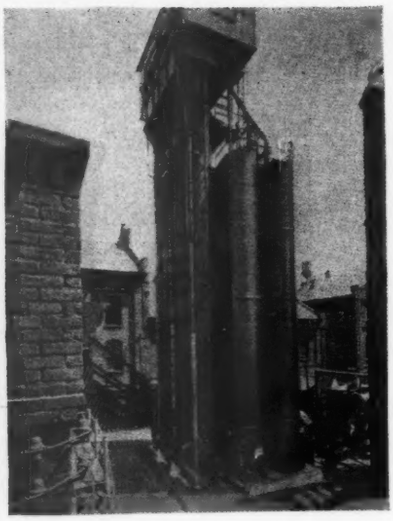
This process is based upon the property of certain thioarsenates of reacting with hydrogen sulfide to form complex compounds which will absorb oxygen with precipitation of sulfur and regeneration of the original thioarsenate.

The author considers the following chemical reactions to be the ones ordinarily occurring in the process. Equation 1 represents the reaction taking place when the solution absorbs hydrogen sulfide from gas and Equation 2 represents the principal reaction occurring in the pressure thionizer when oxygen from the air is absorbed.

(1) $Na_4As_2S_5O_2 = Na_4As_2S_6O + H_2O$
(2) $Na_4As_2S_6O = Na_4As_2S_5O_2 + S$

The preparation of the thioarsenate scrubbing solution is extremely simple, requiring only the mixing of solutions of the proper amounts of soda ash and of arsenic trioxide.





Figures 2 and 3.—Views of Thylox Liquid-Purification plant at Kings County Lighting Company, Brooklyn, N. Y.

Preliminary reactions form the proper thioarsenates, after which occur the regular cycle reactions converting the hydrogen sulfide into precipitated sulfur.

Experiments were made to determine the mechanism of the reactions and to show the effect of changes in pH on the efficiency of the process and it is shown that the pH must be maintained within certain limits for an efficient working of the process.

There is a very slight formation of sodium thiosulfate during the process and this in part accounts for the decreasing value of pH.

If hydrocyanic acid is present in the fuel gas it is removed by this process and converted to sodium thiocyanate. Carbon dioxide has practically no effect on the process because the solution is not alkaline enough (pH is 8 or less) to absorb it.

Ammonium Thioarsenates behave the same as the sodium salts. This is a decided advantage in purifying coal gas, as it normally contains ammonia and has little commercial value in gas plants today, in fact it is stated that three plants are actually operating the Thylox process today with ammonia instead of soda.—*H. A. Gollmar, Jour. Ind. and Eng. Chem., vol. 26, pages 130-132 (1934).*

SOLUBILITY AND LIBERATION OF GAS FROM NATURAL OIL-GAS SOLUTIONS

Improvement in the technique and efficiency of producing crude oil has been helped by an extensive investigation into the nature and properties of crude oil as it exists in the natural reservoir and at various points on its journey through the sand. The knowledge desired relates specifically to the amount of gas dissolved naturally in the oil, the amount liberated on reduction of pressure, the volume the gas occupied originally in the oil, and the inherent energy of the gas which may be utilized to propel oil through the sand to the surface.

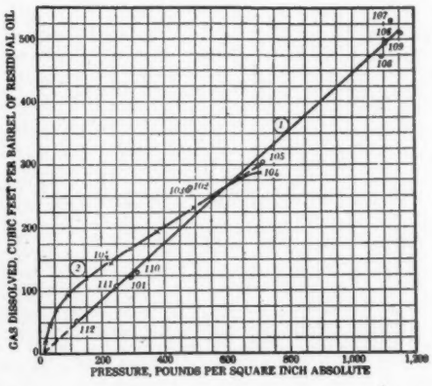


Figure 1.—Comparison of flash and differential liberation of gases (flash liberation): 1, Composite curve based on total solubility data of several samples of Oklahoma City crude oil; 2, solubility curve resulting from differential liberation, sample 104, Oklahoma City 40° A.P.I. crude oil.

The method of liberating gas from oil has an important bearing upon the application of the results obtainable. Differential liberation, for example, would apply more closely to the main body of oil in the reservoir, whereas incremental or flash liberation would apply to the oil in the flow string of a well.

This report indicates that flash liberation of gas results in solubility curves that are approximately straight lines when a considerable excess of free gas is present, so that in calculating the flow of saturated oil-gas mixtures in vertical pipes there is a straight line relationship between the volume of gas in solution and the pressure on the oil. (Figure 1.)

In contrast to flash liberation the experiments show that differential liberation results in solubility graphs of pronounced curvature. Such data should be taken from samples of oil taken at the bottom of the well early in the life of the field, so that it represents as closely as possible the condition of the oil as it exists in the sand. (Fig. 2.)

The shrinkage of the oil due to the liberation of dissolved gas is greater than is commonly supposed. The curves show there is a pronounced increase in the rate of shrinkage at pressures below 100 pounds per square inch.

The interesting fact was disclosed that the first 50% shrinkage of the oil was caused by the liberation of a gas containing approximately 77% of methane, whereas the last 50% shrinkage was caused by the liberation of a much smaller volume of a gas of higher specific gravity.

(Continued on page 38)

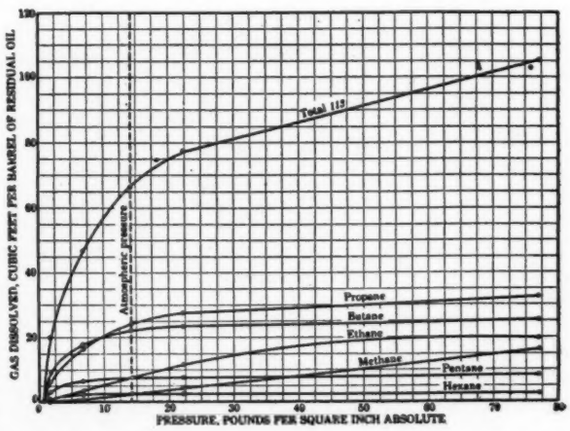


Figure 2.—Solubility of gases under vacuum (differential liberation of gases): 113, Oklahoma City 37.2° A.P.I. crude oil.

Large Volume Water Heating

In Order to Hold the Requisite Amount of Large Volume of Water Heating in Natural Gas Territory A Close Study of the Various Problems Presented by the Prospective User Will Be Neccessary. Good Hot Water Service Is a Rarity

By H. B. YOST

Combustion Engineer, Hope Natural Gas Company, Clarksburg, W. Va.

LARGE volume water heating referred to in this paper consists of all water heating except private residences. It includes hotels, restaurants, office buildings, apartment houses, hospitals, garages, and industrial use.

We, in natural gas companies, have not given the attention to this load that we possibly should. The load came to us without solicitation, and we assume—in most cases rightly—that we have no real competition. We have concentrated our efforts on protecting loads that we were in danger of losing, or to develop new outlets for our product. The result is that we do not appreciate the value of our large volume water load; furthermore, we do not realize that we have lost a large amount of this business.

A study of existing data on apartment houses, hotels, and hospitals, (these represent the largest part of the field) indicates that gas is used for heating water almost every hour during the day, 365 days a year; in fact, with little fear of contradiction, one might say that large volume water heating represents almost an ideal load.

Read before Eastern Natural Gas Regional Sales Conference, Pittsburgh, Pa., Feb. 8-9, 1934.

Now, I suppose you are thinking, why get excited about a load which we have in the bag? It is nearly an ideal load, and is, in most cases, economically without competition. Probably some of you do not know, and others of you may not stop to realize, that until within the last ten or fifteen years there was no such thing as new business in the natural gas territory. We had *all* the business. Practically all this recent new business activity is really an effort to recapture some of the load that we lost by our ostrich-like policy of assuming that there was no competition.

Reasons for Studying Question

There are several reasons for devoting some time to our large volume water heating load.

1. Present-day management realizes that the service rendered by our product is the thing the customer wants. To render this service we must know more about the art of water heating.

2. We do not know the value of this load. I am confident that when this business is evaluated we will find large volume water heating a worthwhile field to cultivate.

3. We have lost considerable of this business:

(a) The use of coal, either hand-fired or with automatic stokers, for heating, has taken over the water heating as a side issue.

(b) Use of oil.

4. In time of peace prepare for war. Let us assure the continuity of our large volume water heating load by consolidating our position instead of trying to recapture it.

A suggested manner of rendering more complete service, and thereby strengthening our position, and making competition more difficult, would be as follows:

1. Make a complete survey of all large volume water heating installations.

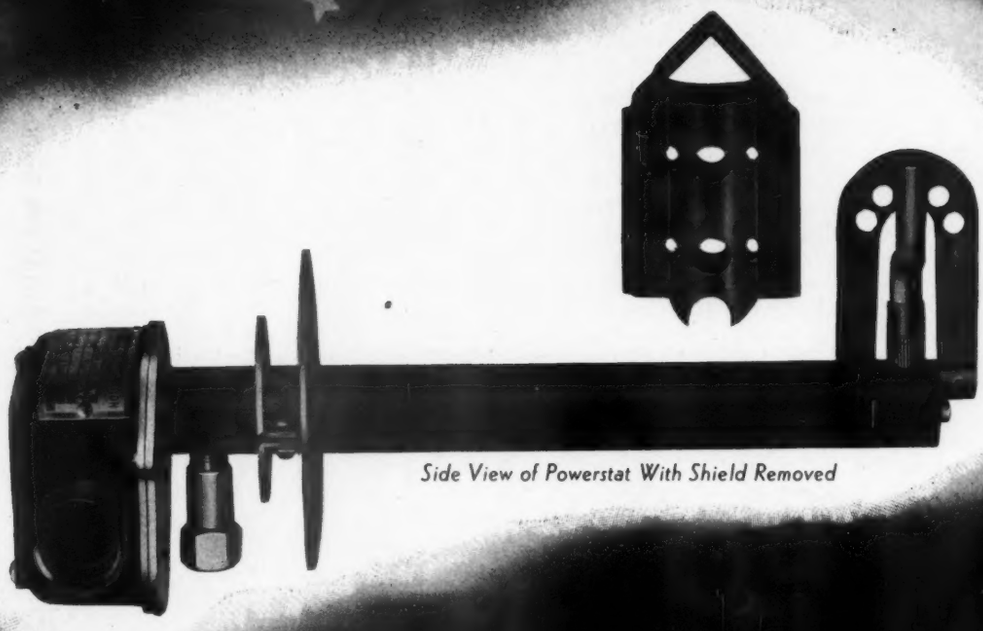
(a) Compare actual gas bills with theoretical. (See A.G.A. Water Heating.)

(b) Determine whether or not the users are getting the kind of hot water service they should expect.

(c) Inspect the system to see that it is of proper design as to storage and water heating capacity.

(d) When all the above have been completed, make an analysis of the situation and determine what recommendations to

MERCOID POWERSTAT



Side View of Powerstat With Shield Removed

AUTOMATIC PILOT CONTROL

RADICALLY DIFFERENT!

QUICK IN ACTION—ABSOLUTELY DEPENDABLE IN PERFORMANCE THE SAFEST AND MOST POSITIVE AUTOMATIC PILOT PROTECTION EVER OFFERED TO THE GAS INDUSTRY

The Mercoid Powerstat is the complete answer to the problem of unfailing pilot protection for gas burning ovens, furnaces or any other type of gas burning appliances.

It operates indefinitely on a time cycle of from ***three to five seconds*** to open or close an electrical circuit. The actuating unit is not a bi-metallic element but employs a new and revolutionary principle of operation which eliminates the inherent weaknesses of existing efforts toward real pilot control.

Available as an accessory of the Powerstat, and also separately for use on non-automatic pilots, is the Pilotrol, which regulates the flow of gas to the pilot at definite pre-determined rate, regardless of any fluctuations within the range of ordinary domestic pressure, thus insuring a uniform pilot flame.

Write for further information

THE MERCOID CORPORATION

Sole Manufacturers of The Mercoid Switch

4225 Belmont Avenue :: Chicago, Illinois

make, if any. The analysis should properly show how conditions could be bettered and the economies of recommended changes. Keep in mind that owners or managers are only interested in changes that have a dollar value, directly or indirectly. The value of the service to your customers will depend upon the soundness of your proposition. Be sure you are right.

2. While I said that natural gas is usually without real competition from other fuels, it is only when all the facts of alternate fuels are known to our customers that the statement is of any value. We cannot blame our customers for believing the bed-time stories fed to them by venders of competitive fuels or equipment when we do nothing to give them our side of the argument.

Do not make the mistake of assuming that because a customer does not kick to us about his bills that he is not scanning every item of operating cost very closely. You will find that in these times owners and managers know more of the details of operating costs than at any other time in the past. They are therefore ripe for a proposition from someone who will offer a means of reducing operating costs. If the costs are too high, it would be better that we tell the customer before our competitors do.

3. Make it possible for the customer to secure modern equipment on equal terms with those that are offered by competitive equipment.

4. The business of cultivating our large volume water heating customers should not be done hurriedly. It would be more desirable for the request for information to come from the customer than to pass it on to him unsolicited. A little diplomacy on the part of our representatives will lead to a request for the information we wish to give him.

We have two very important factors favorable to perpetuating the large volume water heating business.

1. The customer has his equipment for using natural gas, and will not part with it, nor buy new for other fuel unless he is very severely jarred.

2. Natural gas is an ideal fuel, and our customers prefer to use it if the cost is no greater than other fuels—in fact he would pay a premium for it if he knew its real value.

We can capitalize the first, and develop the second. The first is not an unmixed blessing, since he would be almost as hard to sell new equipment for natural gas as he would for competitive fuel.

A third factor is that our competitors either sell hot water equipment incidentally, when they sell heating equipment, or without very carefully studying the water heating needs of this customer. We can keep our present load by knowing more about the water heating business, and by building up a feeling of confidence in the minds of our customers that we have that knowledge.

We need specialists in large volume water heating. The large variety of hot water uses demands that engineering knowledge and experience be back of our recommendations. We will never get this knowledge or experience unless we develop it. Institutions such as hospitals, homes for children or aged, laundries, restaurants, schools, colleges, gymnasiums, hotels, etc., each have their individual problems. We must have a solution to each problem if we wish to retain the business. My personal investigations have disclosed the fact that adequate and suitable hot water systems are a rarity, and that good hot water service is more often a wish than a reality.

My first thought in preparing this paper was to introduce a lot of data that we have accumulated over a period of years; but an investigation of the data available in the A.G.A. book on water heating, and supplementary bulletins, quickly disclosed the fact that what would probably be more timely would be a plea for more use of available information than to add to the present adequate supply. All the methods successfully used in developing and holding other loads can be applied to the large volume water heating problem. By this I mean the use of careful co-ordinated planning, advertising, and selling activities, plus sound engineering and experience.

High Pressure Gas Distribution

(Continued from page 14)

flowing in the line. A main surrounded by frost during a test had a minimum gas temperature of 42 degrees F. at a sufficient distance from the plant so that the higher temperatures at the outlet of the aftercoolers had no noticeable effect, which was determined by varying the aftercooler outlet temperatures. The higher temperatures of the gas in the main tend to raise the temperature of the main, thus slightly lowering the internal pipe stresses resulting from ground temperature differentials.

Expansion Joints—The notoriety given to expansion and contraction strains has been largely due to the quantity of breakage occurring on cast iron mains. During the development of welded joints for steel mains many failures were incorrectly attributed to expansion and contraction rather than poor workmanship which resulted in a total strength in the joint much beneath that of the pipe and, therefore, less than that which experience had found necessary for buried lines. There have been many mechanical developments for the minimizing or mitigation of strains from temperature changes. All of these depend on the main actually changing in length. From the discussion of the gripping power of the ground, it is evident that, to be effective, expansion joints must be located at 150 to 400 feet intervals depending on the types of soil. In the same soils but with the ground frozen around the pipe and also in soils with greater adhesive properties, such as clay, the intervals would have to be reduced. The tests on which these figures are based were conducted on six-inch pipe, which is considerably more rigid than smaller sizes, especially the common distribution size of two-inch. A decrease in rigidity increases the possibility that the pipe will not be in a true straight line between expansion joints, either intentionally by snaking a main in the trench, from natural earth contours or line of trench. Any bend will result in the temperature strain acting as a column loading, which would increase the tendency to bend the pipe and, if restrained, the bending tendency would be counteracted by the internal stress, which would have its maximum value at the point the pipe changes in direction. Thus, the effectiveness of expansion joints depends upon the alignment and rigidity of the pipe.

Even with expansion joints, the pressure of gas carried in the line produces a slight stress with temperature changes, as the majority of such joints have stuffing boxes and power must be exerted to overcome the friction in the stuffing box, which power is counterbalanced by internal stress in the pipe. A corrugated type of expansion joint also requires power to function properly, resulting in a small but equivalent amount of internal stress.

(Continued in April issue)

GAS REFRIGERATION JUMPS THE AVERAGE CUSTOMER'S LOAD 60% OVERNIGHT

Good reason why utilities the country over are organizing now *for "full steam ahead" with Electrolux in 1934!*

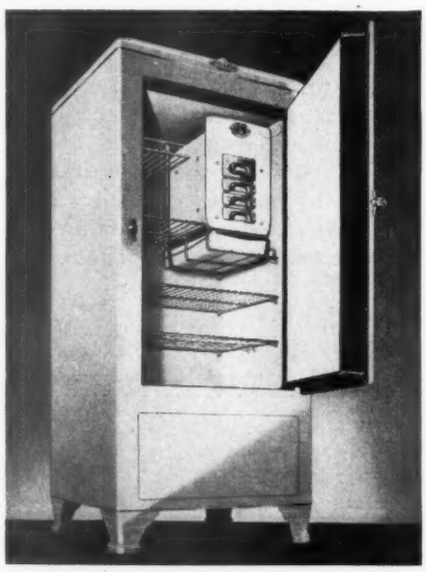
YEARS of promotional effort have pushed the average annual consumption of gas per customer to 28,000 cu. ft., according to a recent estimate.

Now—*overnight*—you can boost this yearly household load much higher . . . bring it up to 45,000 cu. ft. with Electrolux! An increase of 60 per cent!

That's an important thing to remember about gas refrigeration! And here's another: Electrolux builds valuable good will for gas as the modern fuel by providing your customers with the most modern, economical and silent refrigeration yet developed!

Today, with people again in the buying mood, Electrolux offers gas companies real opportunity to capture an important part of the profitable refrigeration market *for gas.*

The beautiful new Electrolux models embody all the modern worthwhile conveniences every woman wants . . . attractive features that will make Electrolux in 1934 easier than ever to sell!



Already, orders for the first two months outstrip all previous records! Throughout the country, gas companies are fast matching their praise for the new Electrolux with record-breaking activity!

If your company has not yet boarded the bandwagon for the biggest year in gas refrigeration history—the time to act is now! Get the new models on the floor and in your windows. Instruct your salespeople on the vital points of Electrolux superiority. Plan a definite sales and merchandising program to carry you with flying colors through 1934!

Your local efforts will be backed by the biggest advertising campaign ever run on gas refrigeration. Don't delay! Write, wire, or phone for full details and sales and merchandising help—*at once!*

Electrolux Refrigerator Sales, Inc., Evansville, Ind.

USES NO WATER

NEW *Air-Cooled* ELECTROLUX

THE SERVEL *Gas* REFRIGERATOR

Problems of the Small Gas Company

(Continued from page 29)

enough financial records are maintained to enable the small company owners to "guess" what their "net" is.

It does not cost much money to keep accurate records of operating and financial transactions and I would suggest to the owners and managers of our small gas companies to get such records in good shape and keep them in proper form. They are the foundation for all your policies, and are certainly the only means of knowing the net "black" or "red" figure at the bottom of the page. A decision to combat any given competition with a class rate must be based on accurate accounting figures. I would say, therefore, that the accounting department is a vital necessity and should be so managed that accurate information is always available.

In reading meters, the very small company can have them all read during a few days near the end of the month and the placing of the records on the company books can be accomplished in a few days. When a company gets to a point in size where it needs a meter reader continuously, then it is time for that company to go to continuous meter reading to keep the flow of work through its office in a steady and even manner; this will also mean bills going out each day and money coming into its treasury in an even flow daily.

Practically all small companies are hampered by lack of sufficient capital with which to successfully operate. This is a situation difficult to overcome because capital is not attracted to the small gas company from an earning standpoint. This means that the owners must, if they are able, furnish all the capital necessary to make improvements to plant and other property. Very frequently, the judicious expenditure of capital at the plant or in the distribution system will make a material saving in costs and is therefore justified. I know of a small company that by the judicious expenditure of capital at the plant reduced its cost of gas in the holder 33% and passed the reduction on to its customers in the form of lower rates. This company is now in excellent position to make its sales mount to new records with the return of prosperity.

I believe the solution to the problems of the small gas company is largely to be found in the manager of that company. His ability to lead his employees and properly direct their efforts will aid materially but his ability to make frequent and thoughtful analysis of his many pressing problems will be a great aid in making his company successful. He should study the use to which company funds are to be put; the manner in which company labor is used; the handling and use of company property. The consideration of such problems in their proper order, i.e., first things first, will also contribute to the solution of the problems of the small gas company, providing the company is well founded in a community having a population large enough to support it.

Gas Heating Calculations Simplified

(Continued from page 11)

in other rooms but their ducts can be dampered down to secure a balance.

Blower Capacity—Add the corrected effective sq. inches of riser area of all rooms including the garage to get total effective riser area. Find the factor V in the Forced Air Heating Table which corresponds to the register temperature employed, then multiply V by the riser velocity in F. p. m. and by the total effective riser area. This will be the theoretical air delivery required of the blower. Add one-sixth for leakage and leeway, and select a blower of this guaranteed capacity for air delivery against static pressure (S. P.) shown by the table below:

Up to 900 sq. in. effective area	1/4"
1300	5/16"
1700	3/8"
2100	7/16"

The above includes 1/8" allowance for the resistance of an air filter or washer.

Required Furnace Capacity—To the room input required to maintain design temperature, add extra heat losses of risers in outside walls, then add a furnace selection factor of 50 per cent which includes 20 per cent reserve capacity, and heat emission into the basement from ducts and furnace casing [assuming the top of the furnace well insulated, not over 140 degrees maximum register temperature, and ducts not covered]. To this add 100 Btu.'s for every sq. in. of air intake from outdoors.

The furnace input times *actual* efficiency (input less flue loss only) should equal the above sum.

Exact Air Changes—To find the cubic ft. of air delivered into a room per hour when the volume is measured at 70, multiply the factor V in the table corresponding to the register temperature by the duct velocity in F. p. m. and by the effective riser area. To find the exact air changes in any room per hour, multiply its Btu. loss by the factor V/H in the table corresponding to the register temperature and divide by the cubic contents of the room.

Technical Digest

(Continued from page 33)

This study of solubility of gas in oil indicates that practically every sample drawn at the well head was undersaturated.

Liberation of the heavier components of the gas, such as propane, butane and pentane, which are present in quantities greater than would be generally expected, should be studied further.

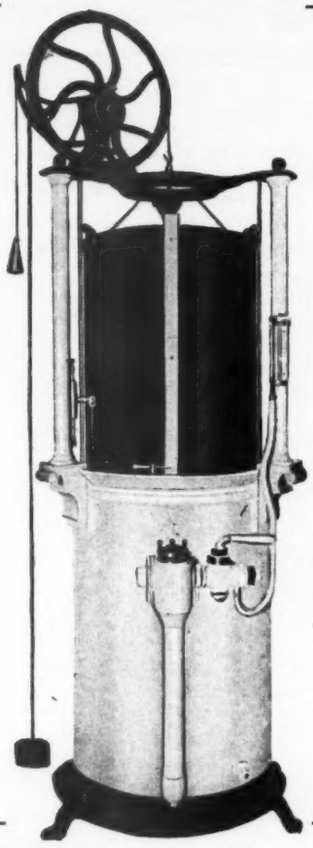
A more thorough understanding of the failure of the heavier gases to conform either to Raoult's or to Dalton's law would have value in solving many problems in the petroleum industry. The work reported herein indicated that under certain conditions an increase in pressure might produce a reverse reaction and cause gas to be liberated from solution.

Knowledge of such action should be of value in designing gas-oil separators and flow strings in wells, in estimating oil reserves and in appraising oil properties.

Work is in progress on the examination of bottom-hole samples, which will probably afford more information on the subject. —*Technical Paper No. 554 by Ben E. Lindsly, Bureau of Mines, U. S. Department of Commerce, Washington, D. C.*

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs



SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

"Since 1928 we have used CHACE *Exclusively* in our *Automatic* Control"

THE FITZGERALD MANUFACTURING Co.

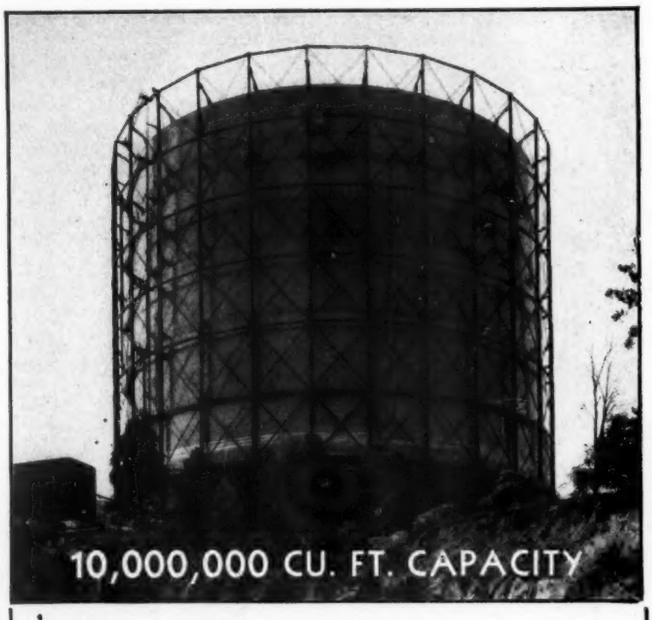
STAR-Rite AUTOMATIC IRONS

Many other manufacturers now use Chace Bimetal for automatic control because of its high sensitivity, accuracy, uniformity and dependable operation under all conditions. . . . Sold in:

SHEETS • STRIPS • FORMS

CHACE THERMOSTATIC BIMETAL
"It Bends with the Heat"

W. M. CHACE VALVE CO.
1610 Beard Avenue Detroit Mich



10,000,000 CU. FT. CAPACITY

HIGH PRESSURE **GAS HOLDERS** LOW PRESSURE

PURIFIERS · TANKS · CONDENSERS
STEEL PLATE CONSTRUCTION

INTEGRITY GOOD WORKMANSHIP FAIR DEALING

CRUSE-KEMPER CO.
AMBLER, PA.

EQUIPMENT NEWS

Roper Issues Fine Brochure

The Geo. D. Roper Corporation, Rockford, Ill., manufacturers of Roper ranges and other appliances, have recently issued a splendid brochure which is not only educational but is also artistically gotten up. The intent of the same is to set forth ways and means for gas companies and dealers to sell their line of ranges with profit and dispatch.

Specifically, the contents start out with an announcement by the president, Mr. Mabon P. Roper and then proceeds to describe their Econo Speed Burner which is described in detail and it also shows an interesting "pop-up" of the burner. Next follows a description of the design of their ranges together with the thermostat which is used on the oven control and then some really fine illustrations in color of several of their headliner ranges.

Then comes several action pictures in color explaining the linings and oven features.

The balance of the brochure is concerned with plans for completing sales and this concludes a "You Name It" sale and contest as well as reproductions of suggested newspaper ads to be used in this contest.

Suggestions for radio broadcasts, window display sets and backgrounds, a number of photographic reproductions of suggested window displays, consumers' folders, newspaper ads, "pep" talks and sales contest plans and analysis of sales resistance, etc., etc.

In the brochure is also featured a description of a handsome booklet entitled, "A Roper Presentation," which is for sale by George D. Roper Corporation and which contains many suggestions for selling gas ranges.

The brochure itself is one of the most attractive ever published by an appliance manufacturer, being profusely illustrated in color, interestingly made up and having an artistic embossed leatherette cover.

Meeting of Geo. D. Roper executives and sales force where their new line of ranges and new selling methods were discussed.

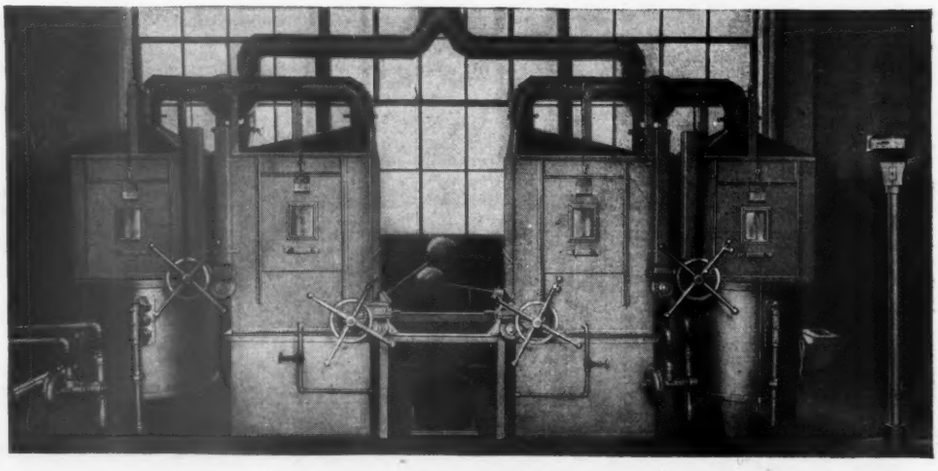
Hydro Automatic Furnace

The Hydro Automatic Furnace was designed primarily for cyanide hardening. The most economical method of obtaining a hard surface that is highly resistant to wear and free from scale. However, it is equally suitable for heat treatment by other salts and by lead, oil or any other liquid bath.

The operation of the Furnace is simplicity itself. The work is fed into the loader by the means of a scoop or the like. By turning a handle which operates the loader, the work is charged into the hardening basket. By rotating the gear crank which is connected to the basket carrier, the work is left in the bath and is quickly dumped into the tank, thus assuring a uniform quench. The load is discharged quickly and easily by rotating another geared crank which is connected to the quench tank basket.

Among the many advantages claimed for this Furnace might be mentioned lower labor costs, increased production, noteworthy fuel savings, saving of hardening solution, reduced handling costs, safety, better . . . more uniform work, less maintenance expense.

The Furnaces are adapted for natural or manufactured gas and are manufactured by the Parker-Kalon Corporation, 200 Varick Street, New York, N. Y.



Hydro Automatic Furnace

Chaplin-Fulton Mfg. Co. Issues New Catalog

The Vigilant Feed-Water Regulator and other well-known steam specialties made by The Chaplin-Fulton Manufacturing Company for forty years, are represented in a new, clearly written, completely illustrated and well-arranged catalog of sixty pages just offered for distribution. In this particular field, besides the Vigilant Feed-Water Regulator, the line comprises the Fulton Boiler-Feed Pump Governor—differential and constant-pressure types, — Fulton Gas-Fuel Boiler Governor, Fulton Altitude Governor, Fulton Vacuum Pump Governor—single diaphragm and duplex types,—Fulton Water Reducing Valve, Fulton Steam Reducing Valve, Constant Pressure Pump Governor, Bingham Gauge Cock, and Fulton Ejector.

The Chaplin-Fulton Company are also manufacturers of an extensive line of equipment for pressure control in the use and distribution of gas and elsewhere.

Correction

On page 17 of the January, 1934 issue under Lowe Formula for Gas Flows the expression in parenthesis in the denominator under the radical should read:

$$\left(\frac{P_{g1}+14.7}{14.7}\right) l_r$$

STANDARDIZE

on

SPRAGUE
CAST IRON GAS METERS
and
REGULATORS

for

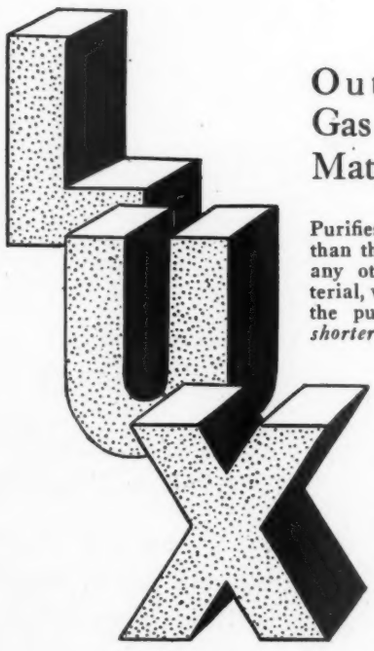
low, medium, and high pressures

Accurate in Measurement.

Economical in Service.

THE SPRAGUE METER CO.

BRIDGEPORT, CONN.



The
Outstanding
Gas Purifying
Material » » »

Purifies *much more* gas than the same quantity of any other purifying material, while it also effects the purification in much *shorter time.*

Write for interesting booklet

THE ALPHA-LUX COMPANY, Inc.

192 Front St., New York

Philadelphia **Chicago**

Byllesby Engineering and Management Corporation

Wholly-owned subsidiary of

Standard Gas and Electric Company

231 South La Salle Street, Chicago

New York **Pittsburgh** **San Francisco**

NEWS of the GAS INDUSTRY

Gas Appliance Institute Opens Washington Office

Gas Appliances Institute has opened a Washington office with Mr. George W. Bean as their representative. The office is located at 510 Albee Building and the telephone number is District 7696. Facilities are available for the Washington meetings of the Institute and manufacturer members are invited to make it their headquarters when in Washington.

Members of the gas appliance industry can address this office concerning any matters that they desire to have taken up directly with the Washington authorities and they are assured of prompt attention.

Indiana Conservation Commission Reports on Gas Wells

According to figures just released by the Indiana Conservation Commission, new gas wells drilled during the last year, the largest of which are in Pike and Gibson counties, have reported a total initial open flow capacity of 82,426,000 cubic feet daily, an average of 1,600,000 a well. Several of these wells are in the old Trenton field of Eastern Indiana, but the only new discovery was a promising pool near Portland in Jay County.

Large areas still exist in Indiana in which there is a steady gas production at pressures ranging from twenty to 300 pounds. Parts of these areas were drilled thirty or more years ago, but have remained productive as a result of the conservation and proper care of the wells. The total reserves of gas in these fields would reach many billions of cubic feet and with continued care of the producing wells, would prove an asset to the state for years to come.

Prospecting for gas in the future will be mainly in Vanderburgh, Spencer, Pike and Sullivan counties and the counties which join them since the chances of making worthwhile discoveries are much greater in this area, according to state officials. Some further tests are likely in the Trenton field.

Program for Joint Conference at Memphis

According to an outline of the tentative program the following speakers have accepted invitations to deliver addresses at sessions of the Southern Gas Association and Southern-Southwestern Sales Conference, which will take place at the Peabody Hotel, Memphis, Tenn., March 21-23:

General Sessions:

F. L. Chase, vice-president, Lone Star Gas Company, Dallas, Texas, and chairman of the Natural Gas Department, American Gas Association; Kurwin R. Boyes, secretary, American Gas Association, New York; H. F. Smiddy, Electric Bond and Share Company, New York.

Sales Conference:

J. F. Orr, United Gas System, Houston, Texas; C. L. Trevitt, Community Natural Gas Company, Dallas, Texas; C. B. Gamble, Birmingham Gas Company, Birmingham, Ala.; E. C. Whitcomb, Lone Star Gas Company, Fort Worth, Texas; E. N. Avengo, New Orleans Public Service, Inc., New Orleans, La.; C. K. Patton, Dallas Gas Company, Dallas, Texas; H. E. Randall, United Gas System, Houston, Texas; C. C. Tucker, Municipal Gas Company, Decatur, Texas; D. H. Levan, Jacksonville Gas Company, Jacksonville, Fla.; W. E. Parrott, Memphis Power and Light Company, Memphis, Tenn.; R. C. Anderson, Mississippi Power & Light Company, Jackson, Miss.; L. I. Baxter, Southern Union Gas Company, Fayetteville, Ark.; Ed. Brewer, Atlanta, Ga.; J. M. Clann, New Orleans Public Service, Inc., New Orleans, La.

At the final session on Friday, March 23, one of the features will be the presentation of a playette, "Kitchen Modernization." Speakers at this time will include H. E. Dexter, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.; C. E. Dougherty, Chattanooga Gas Company, Chattanooga, Tenn.; Rawson Collier, Southern Natural Gas Company, Birmingham, Ala.; Vernon R. Brown, Lone Star Gas Company, Fort Worth, Texas; C. B. Wilson, Little Rock Gas and Fuel Co., Little Rock, Ark.; O. A. Kinzier, Dallas Gas Company, Dallas, Texas.

Public Service Corp. of Hattiesburg, Miss., Sold at Auction

Franchises, pipe lines, its distribution system and other properties of the Public Service Corporation of Hattiesburg, Miss., brought $300,000 in cash when sold at public auction Feb. 12. The sale climaxed a receivership established some months ago by the corporation's bond trustees of Dallas, Tex.

F. M. Tatum, Hattiesburg financier and a son of Mayor W. S. F. Tatum, is the purchaser. The Public Service Corporation is serving a number of South Mississippi cities and towns with natural gas piped from the Jackson fields. Mr. Tatum's bid was the only one made at the sale.

Under the terms of the sale the existing franchise rates must be retained in Hattiesburg and other points served by the Public Service Corporation. The Hattiesburg franchise has an aggregate life of 25 years, of which only about three years has expired.

The sale did not involve the inventories of the corporation which are stored in various warehouses.

Prizes for Refrigerator Sales

Prizes amounting to $6,700 are offered to gas companies all over the United States for those who make record sales in the contests that have been staged by the A. G. A. Refrigeration Committee in connection with the spring sales campaigns of Electrolux air-cooled gas refrigerators, according to an announcement by Ronald Allen Malony, chairman of the Committee, from its headquarters in the Graybar Building, New York City.

The rules of the contest have been so arranged that the smallest gas companies in the country will have the same chances of winning prizes as the biggest utilities in the large metropolitan centers.

The spring contest this year will be centered on the sale of the new 1934 Electrolux models, will cover the months of April, May and June, and is to be known as the "Go-Getter Contest," the theme having been suggested by Peter B. Kyne's story "The Go-Getter," a copy of which will be donated to every gas salesman in the United States competing for the Committee's prizes.

The contest will also be known as the "Blue Vase" contest, the "capturing" of a blue vase being the underlying motive of Mr. Kyne's story.

All awards will be paid not later than August 15, 1934. Each principal award will consist of the presentation of a blue vase in addition to substantial cash awards.

Bring In Indiana Gas Well

The largest gas well in the Petersburg, Ind., field has been drilled in on the John Arnold lease by Claude Noble. This well was gauged in actual test at 6,300,000 cubic feet.

LATTNER

INDUSTRIAL GAS BOILERS

ASME CODE
TUBULAR & FLUELESS

Sizes from one half to thirty horsepower. 100 lb. boilers in stock. Higher pressures to order.

Automatic Gas Controls
Low Water Gas Cut-offs
Boiler Feed Systems

P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

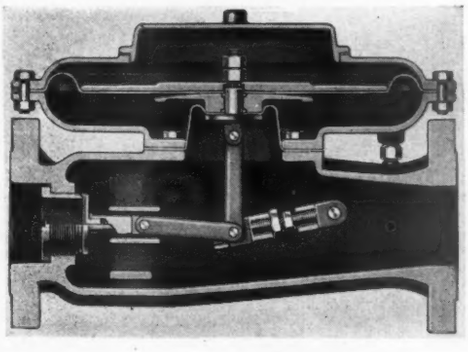
Greater Capacity
Better Performance
Increased Efficiency
For INDUSTRIAL GAS CONTROL

★ The requirements in industrial gas regulation are rigid. One iron-clad requirement is: CONSTANT OUTLET PRESSURE. REYNOLDS Industrial Regulators, proved by performance in actual operation, guarantee smooth, constant outlet pressure even though inlet pressure is decidedly jumpy. But, that is not all. Numerous other outstanding features make them superior for this type of installation. Some of them are: removable valve pocket and orifices, side hand hole, streamlining that directs the gas flow, increasing the capacity, *pressure reduction from pounds to pounds and pounds to inches W. C., single or double valve construction, and equipped with or without pilot control.

Regulators are manufactured in dead weight adjustment and spring type adjustment in either single or double valve construction.

*Body of the Regulator is so machined that a pounds to pounds diaphragm casing or a pounds to inches diaphragm casing may be used, or interchanged.

Write for Details



REYNOLDS Toggle Type Flanged Regulator for the reduction of pressure from pounds to pounds or pounds to inches W.C.

REYNOLDS PRODUCTS

GOVERNORS—Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

REGULATORS—High Pressure Service, Low Pressure Service, Intermediate Pressure, High Pressure Line, Single and Double District Station.

VALVES—Automatic Quick Closing Anti-Vacuum, Relief, Cut-Off.

SEALS—Mercury and Dead Weight.

Reynolds Branch Offices:
421 Dwight Bldg.
Kansas City, Missouri
2nd Unit, Sante Fe Bldg.
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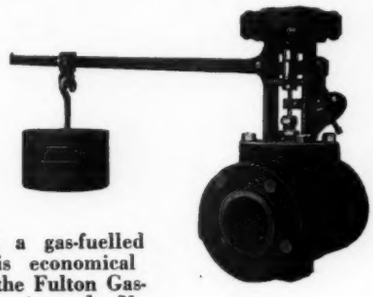
Representatives:
Eastern Appliance Co.
Boston, Mass.
F. E. Newberry
Avon, New Jersey
G. H. Unkefer
428 Boyd St.
Los Angeles, Calif.

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

No Blowing Off—Steady Pressure at All Times



OPERATION of a gas-fuelled steam boiler is economical and regular where the Fulton Gas-Fuel Boiler Governor is used. No blowing off ever occurs. Steam never drops below working pressure, but is held constant at any pressure from 1 to 150 pounds as desired. Special Bulletin No. 1182 on request. Also Catalog of C-F Regulators for all the varied requirements of gas control.

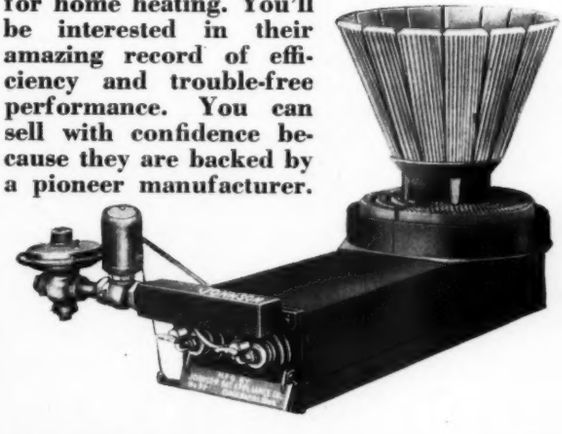
CF

THE CHAPLIN-FULTON MANUFACTURING CO.
28-40 Penn Avenue Pittsburgh, Pa.

FULTON GAS-FUEL BOILER GOVERNOR

NOW—While They're Shoveling Coal—Is the Time to Talk Gas Home Heating

Now is the time to start promoting gas home heating for 1934. Make your sales plans—line up your merchandise. And before you buy, be sure to investigate the Johnson line of automatic gas burners for home heating. You'll be interested in their amazing record of efficiency and trouble-free performance. You can sell with confidence because they are backed by a pioneer manufacturer.



JOHNSON GAS APPLIANCE Co.
Cedar Rapids IOWA

A Halt Called On Gas Rate Reduction

Three judges sitting in the Federal court at San Francisco granted the Pacific Gas & Electric Company an interlocutory injunction restraining the State Railroad Commission from enforcing its $2,100,000 annual rate-cut order. In making the ruling the court held that the commission failed to make a finding of reproduction cost new in establishing the rate base; that no allowance was made for going concern value and that it is clearly doubtful whether the allowed 6⅔ per cent is sufficient to produce a fair return upon the fair value of the property.

H. M. Wright, former superior court judge, is master in chancery and will conduct a hearing and then the Federal court will pass upon the case as to whether or not to make the injunction permanent. It will cost the commission from $25,000 to $50,000 to make the necessary investigation and the commission will ask the court to order the gas company to pay for the investigation, is the understanding.

Receiver for Utility Is Appointed

Charles F. Richards, an attorney of Wilmington, Del., has been appointed by Chancellor J. O. Wolcott, receiver for Southwest Gas Utilities, Inc., with offices in New York and Shreveport, La. A receivership bill was filed against the corporation several months ago. It filed an answer opposing the receivership, but last week withdrew it, admitted insolvency and consented to the appointment of a receiver.

Worcester Gas Light Co. Files New Rates

Elimination of service charges and new rates for all classes of service throughout the entire territory have been announced by the Worcester Gas Light Co., Worcester, Mass., in schedules filed with the Public Utilities Commission in Boston.

Service charges have ranged from 35 cents to $1.85 a month, depending upon the location and size of the meter. Because of these many persons have ordered removal of gas meters for periods ranging from two to five months of the year. The firm estimates these removals as between 1,000 and 1,500 annually.

The schedule also divides the territory into four zones with a different rate for each. There is also created an optional residential rate of interest to those who use gas for house heating, for water heating, or for refrigeration. Formerly, those using gas for house heating were given a rate of $1.30 per M for the first 3,000 cu. ft. and 80 cents per M thereafter. The new rate, which has been extended to include automatic hot water heating and refrigeration will be $1.30 per M for the first 3,000 cu. ft. and 80 cents per M thereafter. The new rate, has been extended to include automatic hot water heating and refrigeration will be $1.30 per M for the first 3,000, 80 cents per M for the next 7,000 and 60 cents per M for all in excess of 10,000 cu. ft. a month.

Industrial rates remain the same except for elimination of the service charge.

Augments Gas Service

The Ohio Oil Company drilled in Bogenschutz well No. 2, three miles from Craig, Colorado, and got a gas well making 1,580,000 cubic feet of gas. This will be turned over to its subsidiary, the Rocky Mountain Fuel Company which has a franchise to serve Craig with natural gas.

Convention Calendar

March

21-23 Joint Conference Southern-Southwest Regional Gas Sales Council — Commercial Section, A. G. A., Peabody Hotel, Memphis, Tenn.
23 New Jersey Gas Association, Trenton, N. J.
25-30 American Chemical Society, St. Petersburg, Fla.
29-30 Joint Spring Conference. Commercial, and Publicity and Advertising Sections, Pacific Coast Gas Association, Los Angeles, Calif.

April

9-10 American Gas Association Distribution Conference, Detroit, Mich.
16-18 Mid-West Gas Association, Sioux City, Iowa.
19-20 Missouri Association of Public Utilities, The Elms Hotel, Excelsior Springs, Mo.
24-26 Southwestern Gas Measurement Short Course, College of Engineering, University of Oklahoma, Norman, Okla.

May

1- 4 U. S. Chamber of Commerce, Washington, D. C.
9-10 Pennsylvania Gas Association, Wernersville, Pa.
14-18 National Fire Protection Association, Atlantic City, N. J.
21-22 A.G.A. Joint Committee Conference of Production and Chemical Committees, Hotel New Yorker, New York, N. Y.

June

4- 5 Canadian Gas Association, Montreal, Can.
5- 8 The Institution of Gas Engineers, London, England.
18-21 National Association of Purchasing Agents, Cleveland, O.

September

1- 4 International Gas Association, Zurich, Switzerland.

October

Week of 29th—American Gas Association Convention and Exhibition, Atlantic City, N. J.

Gas Sales on Pacific Coast

Gas sales, Pacific Coast for the year of 1933 were 135,574,031 thousand cubic feet, compared with 124,653,432 during 1932. The area includes California, Nevada, Arizona, Oregon, Washington and British Columbia. The best gain was in the commercial and industrial sales. The revenue, from gross sales in 1933 was $74,097,662, compared with $73,509,578 in 1932. California's sales totaled 128,126,121 thousand cubic feet, a gain of 10.2 per cent over 1932. Oregon sales were down 13.7 per cent to 3,109,376 thousand cubic feet. Washington and British Columbia combined with 3,724,618 thousand cubic feet, lost 9.6 per cent. Arizona and Nevada combined with 613,916 thousand cubic feet, lost 12 per cent. Meters in use December 31, 1933, totaled 1,613,770, a slight increase over the December 31, 1932, figure when it was 1,603,410 meters.

Election on Municipal Control Demanded

A petition bearing names of 2,600 voters of Muncie, Ind., about three times the number required by law, has been presented to the city council demanding that the council call an election to determine whether the city shall buy the plants of the Indiana General Service Company, electric utility, and the Central Gas Company, gas utility. The action is taken under provisions of the last state law which says such an election becomes mandatory when a petition is presented containing names of five per cent of the total number of voters who cast ballots for office of city clerk in the last preceding municipal election. The only question before the council is whether to hold the election before or at the time of the primaries on May 8.

Expiration of Laclede Franchise

The franchise of the Laclede Gas Light Company is not only neither exclusive nor perpetual, but it actually expired March 2nd, 1917, according to City Counselor Hay. Mr. Hay states as follows:

"The City of St. Louis has the right to acquire its own gas plant or system by construction, or by purchase or condemnation of the properties of the Laclede Gas Light Company or any other existing facilities, and to maintain and operate them. The franchise of the Laclede Gas Light Company is neither exclusive nor perpetual; it expired March 2nd, 1917. The City of St. Louis has the right to contract for a supply of natural gas, and to distribute it locally through its own system. It is recommended that the Board of Aldermen, by resolution, call upon either the Attorney General of the State of Missouri, or the Circuit Attorney of the City of St. Louis, to institute quo warranto proceedings directly in the Supreme Court to determine by what right the Laclede Gas Light Company occupies public streets and places in the City of St. Louis, and conducts a general gas business therein."

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS

FOR

ALL MAKES - ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

—o—

LAMBERT METER CO.

BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

HEATING BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE BOWED TUBE HEATERS

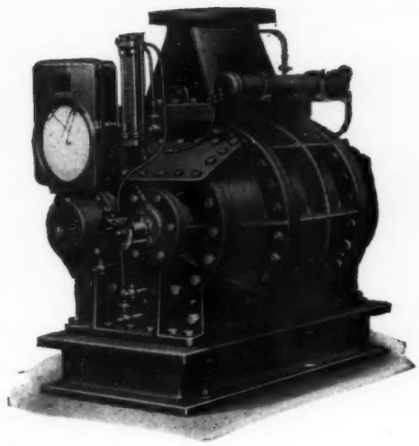
remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

ANDALE COMPANY

1600 ARCH STREET

PHILADELPHIA

ECONOMY



CONNERSVILLE METER HELPS REALIZE IMPORTANT SAVINGS

An oil-gas plant in the Southwest had for years estimated their "unaccounted-for" at 15%, but the recent installation of a Connersville Meter proved it was actually above 35%.

They have since reduced their actual "unaccounted-for" to 16%.

In addition to this very considerable saving, the operators, knowing their make, have succeeded in reducing their oil consumption about 10%, and are making gas of uniform 550 B.t.u.

This experience is merely typical of many advantages to be gained from the installation of Connersville Meters.

Bulletin 40-B-10 gives full descriptive details. It will be gladly sent upon request.

ROOTS-CONNERSVILLE BLOWER CORP.

12th and Columbia

CONNERSVILLE, INDIANA

NEW YORK CHICAGO ST. LOUIS
BOSTON DETROIT
PITTSBURGH LOS ANGELES
POTTSTOWN, PA. SAN FRANCISCO

BLOWER BUILDERS SINCE 1864

Personals

Robert W. Hendee, of Tulsa, who succeeded E. A. Olsen as president of the Oklahoma Natural Gas Corporation, and was succeeded by A. E. Bradshaw in the reorganization of that company last fall, was again elected president on January 27 to succeed Mr. Bradshaw who resigned to become president of the National Bank of Tulsa. Mr. Hendee is looked upon as an authority upon matters relating to the natural gas industry in general and affairs of the Oklahoma Natural in particular.

Wm. W. Bodine has been elected executive vice-president of The United Gas Improvement Company, Philadelphia, Pa. This is a newly created office and was created at the meeting of the Board of Directors of the company on January 24th.

F. H. Holden, supervisor, advertising and publications for the Southern California Gas Co., Los Angeles, Calif., has resigned this position after an 11-month leave of absence during which he has been acting as secretary-manager of the Printing Trades Association of Los Angeles. Mr. Holden's affiliation with the printing industry will be permanent.

J. M. Lynn has assumed the duties of sales supervisor for the Dallas (Texas) Gas Co., succeeding S. C. Grasinger who recently resigned this position after four years of service with the company.

Robert H. Patterson, who has been manager of the Arlington Gas Light Co., Arlington, Mass., since 1928, has just been elected vice-president and manager of the Lawrence Gas and Electric Co., Lawrence, Mass., and assumed his new duties during the week of February 5th.

As his successor in Arlington, the directors of the Arlington Gas Light Co. have elected Horace G. Taylor, who has been manager of the Lawrence company since 1929.

This promotion for Mr. Patterson is another step upward in the career of a man who, while still in his thirties, has held many important positions in the New England public utility field. Born in Providence in 1897, Mr. Patterson entered the gas industry as a cadet engineer in the Providence Gas Company. During the war he operated the government gas plant at the military academy at West Point. After the war he entered the employ of the Worcester Gas Co. as assistant superintendent of production. In 1920 he went to North Adams as assistant manager of the gas company there, and went to Arlington in 1928 as manager. During his service the Arlington company expanded by taking over the Lexington and Woburn gas companies, so that the combined company is now one of the largest in the State.

Horace G. Taylor, the new Arlington manager, has had a long and varied career in the gas industry. A native of Trenton, N. J., he was graduated from the Stevens Institute of Technology at Hoboken in 1899, joined the engineering staff of Humphreys and Glasglow of London, England, and for a number of years traveled all over the world installing water gas plants in England, Australia, New Zealand, Holland and the United States. In 1905 he was sent to Lawrence to install an underground electric system, and when this job was finished, he entered the employ of the Lawrence company as engineer in charge of all construction. He was made manager of the Lawrence company in 1929.

Major T. J. Strickler, Vice President and General Manager of the Kansas City Gas Company, has been unanimously elected by the Board of Directors of the Kansas City Chamber of Commerce as their candidate for the Directorate of the Chamber of Commerce of the United States to represent the Seventh election district.

The Kansas City Chamber of Commerce, through their managing director, W. M. Symon, is conducting Major Strickler's campaign. The American Gas Association has endorsed and is enthusiastically supporting his candidacy. At the present time, more than two hundred endorsements have been received from the leading Chambers of Commerce and Trade Associations in the forty-eight states of the union.

Major Strickler has been one of the most active members of the Kansas City Chamber of Commerce for many years. He has served several terms as Vice President of the Civic Department; served on many important committees of the Chamber, and has been Kansas City National Councillor on numerous occasions to the National Chamber of Commerce meetings.

He has also been very active in the affairs of the American Gas Association. Recently he served as departmental Vice President and Chairman of the Natural Gas Department, and at the present time is a member of the Managing Committee and Advisory Committee of the Natural Gas Department, and is a member of the Advisory Council of the American Gas Association.

For a number of years, Major Strickler has been an outstanding figure in the affairs of his city, state and nation. He has served as President of the Missouri Association of Public Utilities, President of the Kansas City Section of the American Society of Civil Engineers, President of the Kansas Engineering Society and Commander of the American Legion, Department of Missouri. He has also served as President of the Kansas City Safety Council, Vice President of the University Club, and Vice Chairman of the Club Presidents' Round Table. In 1928 and again in 1929 he served as General Chairman for the Kansas City Charities Fund.

At the present time, in addition to his varied activities in the Chamber of Commerce and the American Gas Association, Major Strickler is serving the following organizations:

Executive Committee of the Missouri Association of Public Utilities.

Vice President and Trustee of the Kansas City Horner Conservatory of Music.

Trustee of the Kansas City Art Institute.

Vice Chairman of the Board of Trustees of the Kansas City Philharmonic Orchestra.

Executive Committee of the Employers Association.

Director of the Kansas City Safety Council.

Director of the Kansas City Council Boy Scouts of America.

Director of the Kansas City Section American Society of Civil Engineers.

Among other organization affiliations, he is also a member of:

The Society of American Military Engineers, the American Legion, the Engineers Club of Kansas City, Rotary Club, Kansas City Club, University Club, Sigma Chi Fraternity and Tau Beta Pi Fraternity.

The Kansas City Chamber of Commerce feels that Major Strickler's election would be of distinct advantage to the section which he would represent, particularly so because this part has not been directly represented for many years.

The American Gas Association strongly favors Major Strickler's candidacy and has sent endorsement blanks to its members. All public utility executives are urged to contact their local Chambers of Commerce and Trade Association wherever they are members of National Chambers of Commerce and not only secure endorsements of his candidacy, but also secure the endorsement of their National Councillor in Major Strickler's behalf. It is very important that these contacts be maue at once, as they will be decidedly more effective now than if secured later.

GPM
IRON HYDROXIDE

A quality oxide giving steady dependable purification from the first day of use to the last.

Gas Purifying Materials Co. Inc.
Foot of Halsey St
Long Island City, N.Y.
Branch Yard
Providence R.I.

"POSITION WANTED"

Wanted Position—Manager or Superintendent. Experienced in all branches of the Manufactured Gas Industry, Coal or Water Gas, High or Low Pressure distribution, have made good in the standardizing run down, worn out plants and building up customer good will, any size plant from one to twenty thousand meters. Salary first year secondary consideration. Address Box No. 1052, c/o AMERICAN GAS JOURNAL, 53 Park Place, New York City.

MODERNIZE WITH MOHAWK PRODUCTS
ALL STEEL
MOHAWK HI-SPEED TRAILER
TOOL AND SUPPLY TRAILERS
FOR GAS AND ELECTRIC COMPANIES.
HOTSTUF BITUMEN HEATERS.
LEAD AND COMPOUND MELTING POTS.
Hotstuf
MOHAWK ASPHALT HEATER CO.
56 WEAVER ST. SCHENECTADY, NEW YORK
100 PARK PLACE, NEW YORK, NEW YORK

THE GOODMAN STOPPER
GOODMAN
USED SINCE 1897
2" HANDLE & LOCKING SLEEVE
GAS MAIN STOPPER
The Reliable Shut-Off for Street Mains
Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.
Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, New York

PURIFYING MATERIAL — BAGGED, OR IN BULK
Manufacturers of GOVERNORS, APPARATUS and EQUIPMENT
IRON Connelly Iron Sponge and Governor Co. SPONGE
Elizabeth, N.J.
Chicago
1876 [USE THE BENEFIT of 58 YEARS EXPERIENCE] 1934

GRAVER
NRA
Gas Holders and Accessory Equipment
The engineering department of GRAVER offers you expert service in modern economies of design and erection. We are equipped to handle low and high pressure gas holders of all types and all accessory equipment of steel plate construction with necessary fittings, either to your specifications or designed to your needs. GRAVER manufacturing and fabricating facilities are unexcelled, yet production costs are low. GRAVER field erection is recognized for its good workmanship. Consult GRAVER on your requirements.
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General Sales Office:
332 S. Michigan Avenue, Chicago
General Offices and Factory
East Chicago, Indiana

Obituary

EDWARD HENRY EARNSHAW

Edward Henry Earnshaw, former chief engineer of the gas department of the Public Service Electric & Gas Co., of New Jersey, a widely known expert on gas and steel engineering problems, died February 1st of pneumonia at his home in Orange, N. J. He was seventy years old.

Born in New York City, Mr. Earnshaw attended private schools in New York and New Jersey. In 1883 he was graduated from the University of Pennsylvania, where he was a member of the varsity rowing crew. He entered the employ of the Bethlehem Steel Co. and subsequently managed blast furnaces in Pennsylvania and the South.

Mr. Earnshaw entered the employ of the Public Service Co. as assistant general manager in 1907 and in 1925 he was appointed chief engineer of the gas department. He retired from active work in 1929.

Mr. Earnshaw was a former director of the Taylor Iron and Steel Co. at High Bridge.

He is survived by his widow, a son, three daughters, five brothers, two sisters, and 14 grandchildren.

GEORGE A. LANE

George A. Lane, former superintendent of the meter repair division, The People's Gas Light and Coke Company, Chicago, Ill., died February 11 at his home in that city. Mr. Lane, for years active in affairs of the American Gas Association, was sixty-five years old and retired from active work last July.

Mr. Lane was regarded as an authority on gas meters, and his work in this field earned for him recognition throughout the gas industry. After serving many years as a member, he was elected chairman of the Meter Committee, Technical Section, A.G.A., in 1924 and held that office through 1928. He was the author of various reports and papers and contributed frequently to the meter short course at Iowa State College. He won signal honor for his patents on certain types of meters, and won a wide reputation for his lectures on that subject before Middle West institutions.

Mr. Lane received his early education in the public schools of Chicago, supplemented with a business college course. When fourteen years old he became a plumber's helper. He began his gas company career with the old Hyde Park Gas Company, Chicago, in 1887, where he was meter reader, bill deliverer, service helper and eventually meter repairer. In 1922 he was appointed superintendent of the meter shop and three years later took full charge of the repair division.

GLENN FORD McKINNEY

Glenn Ford McKinney, vice president of the National Fuel Gas Co., New York, N. Y., died February 15, his sixty-fifth birthday, at his winter home at Southern Pines, N. C. Mr. McKinney was a graduate of Princeton University and practiced law for many years in New York. He was twice married, his second wife being the late Jean Webster, author and playwright. He is survived by his father, a son, and a daughter.

TRADE NEWS

Electrolux Promotes A. J. McGinty

A. J. McGinty, who has been for the past five years assistant advertising manager of Electrolux Refrigerator Sales, Inc., with headquaters at 51 East 42nd Street, New York City, has been promoted to do sales educational work among Electrolux distributors in all sections of the country. His duties will involve extensive traveling most of the year with occasional trips to the Electrolux plant at Evansville, Indiana.

The position to which Mr. McGinty has been appointed became necessary due to the growing demand from gas utilities everywhere for assistance in the training of their salesmen on the subject of Electrolux selling.

Announcement of New Hays Representatives

The Hays Corporation, Michigan City, Indiana, is pleased to announce the following new representatives:

Mr. T. C. Messplay, 2219 E. 69th Terrace, Kansas City, Missouri, state of Kansas and Western Missouri.

Mr. Fairman B. Lee, 114 Railroad Avenue South, Seattle, Washington, state of Washington.

Leinart Engineering Company, 427 Walnut Street, Knoxville, Tenn., eastern Tennessee.

Engineering Sales Company, Meyer Building, Holland, Michigan, western Michigan.

E. M. Gilbert Engineering Corporation Is New Name for W. S. Barstow and Company

The name of W. S. Barstow and Company, Inc., has been changed to E. M. Gilbert Engineering Corporation, according to announcements received from the Company's headquarters at 412 Washington Street, Reading, Pa. The new name was voted at a recent meeting of the board of directors to identify the organization with its president, E. M. Gilbert. Vice-presidents of the company are A. P. Campbell, J. A. Powell and R. L. Baker.

In 1916 Mr. Gilbert became vice-president and chief engineer of W. S. Barstow and Company and in 1929 was elected president of the company. Mr. Gilbert has also served as officer and director in various utility and other companies.

W. S. Barstow and Company was incorporated in 1906 to function as a centralized engineering, construction and management company for various utility companies. For many years the corporation has not only acted as engineers and constructors for new utility power plants and transmission systems, but has also acted in a general consulting capacity in a wide variety of construction and operating problems.

Smith in Charge of General Electric Gas Furnace Sales

H. B. Smith has been appointed in charge of gas furnace sales activities of the merchandising division of the Air Conditioning Department of the General Electric Company, with offices in New York City. Mr. Smith, who will work with district sales representatives, dealers and gas utilities in sales supervision and training, has had several years of experience in the promotion of gas heating, with the Consolidated Gas Company of New York and with the Central Hudson Gas and Electric Company of Poughkeepsie, N. Y.

Declares 50% Stock Dividend on Undivided Profits

That well-planned sales and advertising plus sound financial standing, can produce profits even during such disturbed conditions as existed during the recent depression, is proved by the recent 50% dividend on undivided profits declared by The Meriam Company, 1955 West 112th Street, Cleveland, Ohio, at its directors' meeting held February 16th, 1934.

The company's activities cover a wide field which includes the re-building of engines, the manufacture of meters for measuring the pressure and flow of liquids and gases, and a well-equipped welding repair department in which electric, gas and atomic hydrogen processes are used.

Naylor Pipe Company Gets Large Order

The Coltexo Corporation, Monroe, Louisiana, have placed an order with the Naylor Pipe Company, Chicago, Illinois, for approximately 17 miles of 16-inch O. D. Naylor Spiralweld Toncan Iron Pipe, Victaulic coupled, for a gas line in the Panhandle of Texas.

KITSON Quality

GAS STOPS

G-501 Flat Head
Iron Body
Brass Plug

—of every Type and Size
—for all purposes

It makes no difference whether it's a Standard, Extra, Special or Heavy Service Type—or whether it's a Flat Head, Square Head, Lever or Wing Lock Key—or even whether it's a Brass or Iron Body . . . they're all made (and guaranteed as to material and workmanship) by Kitson.

Like the Sterling Mark on Silver, the symbol "K-Co" on a Gas Cock or Valve stands for a known, definite quality.

We suggest that you write us for LITERATURE and DATA regarding all our Gas Company Products.

KITSON CO.
WESTMORELAND & STOKLEY STS.
PHILADELPHIA PENNSYLVANIA
Address Department "G"

Domestic Gas Appliances
BY
A. M. Apmann
A FUND OF VALUABLE INFORMATION WHICH EVERY GAS MAN SHOULD HAVE FOR HANDY REFERENCE.
ONLY $1.00
FOR SALE BY
American Gas Journal

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Send me the American Gas Journal each month for one year. I enclose $2.00 in payment of this subscription.

Name ..... **Position** .....

Address .....

Fiftieth Anniversary of The Fox Furnace Company

Just 50 years ago, back in the days of bicycles built for two, coal oil lamps, and horsehair sofas, F. B. Fox who previously had been the agent for the Richmond Stove Company, organized The Fox Furnace Company. The new industry was started at Cleveland, Ohio and for the next decade Mr. Fox guided its destinies and saw that a firm and lasting foundation was laid.

In 1894 Henry Wick purchased the young company and assumed its management, with Ernest C. Fox, son of the founder, continuing his association with the organization for some time thereafter. Mr. Ernest C. Fox as proprietor of the Independent Register Company of Cleveland has continued his activities in the warm air heating field and is well known throughout the industry.

At the turn of the century, in the year 1900, a site for a new factory was selected in Elyria, a thriving city twenty-five miles west of Cleveland. The factory and foundry building erected here had a floor area of approximately 37,000 square feet. New buildings and additions, necessitated by the expansion of the business today occupy an area of approximately twenty-five acres.

The American Radiator Company purchased control of The Fox Furnace Company in 1923. At this time the manufacture of heating stoves and ranges was stopped. Production henceforth was concentrated on warm air heating equipment. The products which are known by the trade name of Sunbeam now consist of cast iron and boiler plate furnaces; gas-fired furnaces; and residential air conditioning units for all fuels.

One of the first catalogs, a 36-page booklet, of the company, which was probably issued in 1896, reveals many interesting facts about furnaces in the nineteenth century.

One feature of Fox Furnaces was the *Dust Flue* which "connects the ash pit and combustion chamber so that dust created by the shaking or dumping of the ashes is conveyed by a natural draft into the smoke flue and not into the cellar."

Another feature was the *Air Tube* which draws the circulating air "directly over the hottest portion of the fire, warming the air with great rapidity."

On the subject of water pans the catalog has this to say: "There is a diversity of opinion among furnace manufacturers and dealers as to the value of pans for the evaporation of water."

The promising future in prospect for warm air furnaces made the year 1884 particularly auspicious for the launching of The Fox Furnace Company. Now, as the organization marks its golden anniversary, another new product, the residential air conditioning unit, makes the year 1934 an equally auspicious milestone.

D. W. Haering & Company, Inc., Announce Additions to Sales Staff

D. W. Haering & Company, Inc., manufacturers of H-O-H water treatments announce the following additions to their Eastern sales staff operating from their New York office, 1451 Broadway, recently opened:

Edwin H. Chandler in Rhode Island.

Albert Nickerson, Albert Stewart, C. W. MacKinnon in Massachusetts.

D. W. Haering & Company, Inc., also reports an increase in H-O-H sales in 1933 of 111% over 1932. The gain in sales was well distributed throughout the year.

Electrolux Has Extensive Plans For Advertising During 1934

Mr. H. S. Boyle, sales promotion manager of Electrolux Refrigerator Sales, Inc., speaking at a meeting of the Pyrofax Division of the Union Carbon and Carbide Company at the Hotel Roosevelt, New York City, on February 2, told of the extensive advertising planned by Electrolux in connection with its 1934 sales promotion campaigns.

Mr. Boyle also presented one of the 1934 new Electrolux models and explained added improvements which he said should fit in ideally with Pyrofax sales activities.

Urging Pyrofax salesmen to take advantage of the promotional efforts of Electrolux in pushing the sale of gas refrigerators in the bottled gas field, Mr. Boyle stated that his company would be among the biggest advertisers in the refrigeration industry.

"There is no more logical field than that where Pyrofax is used for the promotion of the sale of Electrolux refrigerators," said Mr. Boyle. "In addition to the standing of Electrolux as the finest product of its kind on the market, the Pyrofax salesmen have the additional advantage of co-operation with Electrolux, not only through its advertising in newspapers, general magazines and trade journals, but through promotional literature ready for distribution on an unprecedented scale."

Mr. Boyle stated that Electrolux Refrigerator Sales, Inc., was ready to co-operate with Pyrofax salesmen in educating Pyrofax users with the advantages of Electrolux ownership. Mr. Boyle also urged Pyrofax salesmen to acquaint themselves with the product, as a prerequisite to success. "Pyrofax is a branch of the gas industry," said Mr. Boyle, "and there is no reason why Electrolux should not gain the same degree of acceptance among Pyrofax users that it has gained among other gas users throughout the country, about 350,000 of whom now own Electrolux refrigerators."

The meeting was attended by a delegation of Electrolux executives and field representatives including F. E. Sellman, vice-president; George L. Roach, sales manager, B. O. Brown, assistant sales manager; D. J. Myers, R. N. Lindgren, E. A. Dunham, Jr., A. E. Lee, G. W. Anderson, R. J. Horns and P. B. Wiske.

Pittsburgh Equitable Announce New District

The Pittsburgh Equitable Meter Company of Pittsburgh, Pennsylvania, announce that they have established a new district to serve the territory of Central

C. F. Thomas

and Western New York State. C. F. Thomas, who has been acting as New York State representative for a number of years, will be District Manager in charge of the new territory, assisted by D. A. Gardner, who has also represented the company in the past in various sections of the country.

An office will be opened at some point in this territory in the near future—the exact location to be announced as soon as negotiations have been completed.

Chairman of Divisional Code Authority for the Mechanical Rubber Goods Group Announced

J. H. Connors, vice-president and general manager of the mechanical goods division, B. F. Goodrich Company has been named chairman of divisional code authority for the mechanical rubber goods group of the industry, it is announced by A. L. Viles, president of The Rubber Manufacturers Association.

Others selected to serve with Mr. Connors include H. N. Young, Hamilton Rubber Mfg. Co., Trenton, N. J., C. D. Garretson, Electric Hose & Rubber Co., Wilmington, Del., A. L. Kress, deputy administrator of the National Recovery Administration and Viles.

Connors, a principal figure in the rubber industry, has been associated with Goodrich for more than 20 years.

Correction

On page 14 of the December, 1933 issue one of the authors' names has been incorrectly spelled. The name should be **W. Zwieg and not Zweig.**